DOCUMENT RESUME

ED 253 418 SE 045 385

AUTHOR	Entine, Lynn; Fisher, Ellen, Ed.
TITLE	Our Great Lakes Connection. A Curriculum Guide for Grades Kindergarten through Eight.
INSTITUTION	Wisconsin Univ., Madison. Univ. Extension. Environmental Resources Center.
SPONS AGENCY	Joyce Foundation, Chicago, IL.
PUB DATE	85
NOTE	210p.; Also sponsored by the Wisconsin Coastal Management Program.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC09 Plus Postage.
DESCRIPTORS	Curriculum Guides; Drama; Elementary Education; *Elementary School Science; Environmental Education; Geography; History; Interdisciplinary Approach; Junior High Schools; *Language Arts; *Learning Activities; *Marine Education; Navigation; Science Education; *Social Studies; *Water Resources
IDENTIFIERS	*Great Lakes

ABSTRACT

Presented are 24 activities which focus on various topics related to the Great Lakes. These activities, suitable for students in kindergarten through grade 8, are designed to fit into existing geography, science, language arts, drama, history, social studies, and economics curricula. In addition to providing information about the Great Lakes, the activities are intended to help students develop their observational, creative, inquiry, analytical, and problem-solving skills. Each activity includes: (1) background information; (2) recommended grade level(s); (3) recommended subject area(s); (4) procedures; (5) extension activities; and (6) list of resources. Student materials (such as worksheets and game sheets) are included when applicable. (JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED253418

SE 045 385

Our Great Lakes Connection

A Curriculum Guide For Grades Kindergarten Through Eight

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
● Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Ellen Fisher
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

By Lynn Entine • Project Director and Editor, Ellen Fisher

the Great Lakes Connection
MATH

Copyright 1985 by the Board of Regents of the University of Wisconsin System (UW-Extension Environmental Resources Center)

Reproduction is permitted for non-profit educational purposes

Acknowledgments

Creating learning activities that bring the Great Lakes into classrooms has been a fascinating challenge. We have been encouraged at each step along the way by enthusiastic people and excellent resources. They have made the project not only possible, but fun.

Our thanks go first to The Joyce Foundation of Chicago and the Wisconsin Coastal Management Program for seeing the need for these materials and underwriting their creation.

Secondly, we deeply appreciate the multi-talented people who contributed ideas, resources, activities, enthusiasm and a love of the lakes before, during and after the April, 1983 curriculum development workshop:

> Bill Andrews, Amy Badeau-Golembeski, Margaret Bogue, Mary Goodley, Pat Hansen, Ed Hessler, Charles Brauer, Marcia Christianson, Jack Davis, Dave Engleson, Nancy Everix, Guy Kaplan, Frank Koehn, Gene Krejcarek, Dick LeClair, Jim Lubner, Helen Mallmann, Vicki Martin, Anna McNeil, Jim Mellberg, Jim Musso, Maura O'Connor, Hilda Parfrey, Fins Peterson, Dick Presnell, Peter Roop, Linda Schroeder, Al Shea, Bill Skadden, Winnifred Smith, Bill Stonebarger, Isacco Valli, Sister Julia VanDenack, Sam Vaughn and Dennis Yockers.

Special thanks to Bruce Kerkove who couldn't attend the workshop (to the great disappointment of his 4th grade class) but shared his entire library of Great Lakes activities and resources with us, and to Margaret Bogue who was always ready at the other end of the telephone with references, resources, citations, and advice.

Howard Kanetzke, Education Coordinator at the Wisonsin State Historical Society, Patricia Harris, Curator of the Old Lighthouse Museum in Michigan City, Indiana and Peyton Smith and Phil Keillor, UW-Sea Grant College Office, dug deep into their files and their experience to supply us with facts, maps, fliers and contacts.

We're especially grateful to Jim Harris and Sumner Matteson whose personal acquaintance with the habits and eccentricities of Great Lakes gulls brought vitality to the Gull Game.

Many other people we have not named we gratefully remember for supplying just the right piece of information when we needed it, whether it was a mathematical formula or the distribution of friable sandstone.

For the clarity of these materials we are indebted to the artistic talents of Jana Fothergill, the thoughtful pen of editor Elizabeth Lambert and typists Barbara St. Cyr and Julie Kulick. Our personal thanks go also to Ramona Weakland Warden and Nancy Erickson for their ready assistance and behind-the-scene support.

Any errors of fact, tone or interpretation are, of course, our responsibility. We will appreciate hearing any comments or suggestions from you who are reading and using these materials. Write or call us at: 1450 Linden Drive, UW- Madison, Madison, Wisconsin 53706 (60[illegible]-2106.

[illegible]llen Fisher, Project Director

Table of Contents

Pages

Introduction 1
Activities at a Glance 2
Resources to order Ahead 4

Activities

1. Getting to Know the Great Lakes 9
2. What is Sand? 19
3. Rocking Around 23
4. Voyage to the Bottom of the Lake 25
5. Create a Critter 37
6. Here's Looking at Your Place 39
7. Great Songs of the Great Lakes 43
8. Ojibway—Early Immigrants to the Great Lakes Region 53
9. Bartering—Indian and Voyageur Style 67
10. Explorer's View of the Great Lakes—Historical Perspective 73
11. What Happened to the Griffon? 79
12. The Origin of Lake Michigan and Other Legends 85
13. TV Documentary—Three Centuries of Great Lakes History 93
14. Immigrants Write Letters Home 109
15. Mining History: Students Dig into the Great Lakes 115
16. Student Historical Investigation: Critiquing History and Social Studies Books from a Great Lakes Perspective 121
17. Astronaut's View of the Great Lakes—Global Perspective 123
18. Chart Your Course—Reading a Navigational Chart 131
19. How the Great Lakes Modify the Growing Season 141
20. Snowmaking—Great Lakes Style 147
21. Math Path to the Great Lakes 157
22. The Great Lakes Shipping Game 161
23. The Gull Game 185
24. Solving the PCB Problem at Manitou Harbor 201

Introduction

Listen! You can hear the rushing roar of foamy green waves reaching out to slap the sugar-sand shores. Your bare toes briefly mark the wet, brown sand before the next wave splashes them away, swirling around your ankles. A grey and white gull gives a raucous screech as it circles over your head. Welcome to the Great Lakes.

Your favorite Great Lake scene may look and sound quite different—rocky, red- brown cliffs topped with towering pines, stony beaches gently lapped by greenish wavelets, the mournful sound of ships' horns on a foggy night. The lakes are fascinating. They get into your blood.

The two dozen activities in this series are designed to help you share the fascination of the Great Lakes with your students. They "cover the waterfront" from the northern tip of Lake Superior where Nanabush The Trickster once lived to the port of Montreal where the bulk freighter *Golden Hind* unloads Canadian wheat, and from the dizzy heights of a meterological satellite to the murky depths of a "Voyage to the Bottom of a Lake." They present background material for the teacher, student activities, questions for discussion, maps, readings, pictures, game boards and resource references.

We hope you will take these materials and integrate them into your regular classroom programs. They are designed to fit into existing language arts, history, geography, social studies, art, math and science curricula. For these reasons they do not present a specific curriculum outline of their own.

Each activity includes information about some aspect of the Great Lakes and directions for student activities which exercise skills of observation, creativity, inquiry, analysis, problem-solving, expression, and others. We believe that you, the classroom teacher, know the abilities and needs of your students better than anybody. So we leave it up to you to decide what your objectives for the lesson will be. We have not included them.

Please take these activities and make them your own. Pull them apart, mix them together. Some parts of the activities for younger children can be interesting for older ones as well. Higher level activities can be simplified for lower grades. Use them to achieve your teaching objectives and to introduce your students to the greatest freshwater resource in the world—the Great Lakes.

Activities At A Glance

Grade Levels	Activity	Activity Title	Subject Areas
1-4	1	Getting to Know The Great Lakes	Geog.
K-2	2	What is Sand?	Sci., Art, L.A.
K-3	3	Rocking Around	Sci., Art, L.A.
3-6	4	Voyage to the Bottom of the Lake	Sci., Art, L.A., Music
K-3	5	Create a Critter	Art, L.A., Dr.,Sci.
3-8	6	Here's Looking at Your Place	Geog., L.A.
3-8	7	Great Songs of the Great Lakes	His., Music
3-6	8	Ojibway—Early Immigrants to the Great Lakes Region	His., L.A., Art
4-6	9	Bartering—Indian and Voyageur Style	His., L.A., Soc. St., Econ.
4-8	10	Explorer's View of the Great Lakes—Historical Perspective	Geog., His.
4-6	11	What Happened to the Griffon?	L.A., His.
2-6	12	The Origin of Lake Michigan and Other Legends	L.A., Soc. St.
5-8	13	TV Documentary—Three Centuries of Great Lakes History	His., L.A., Dr.
6-8	14	Immigrants Write Letters Home	His., L.A.

7-8	15	Mining History: Students Dig into the Great Lakes	His., Econ.
7-8	16	Student Historical Investigation: Critiquing History and Social Studies Books from a Great Lakes Perspective	His., Soc. St. L.A.
4-8	17	Astronaut's View of the Great Lakes—Global Perspective	Geog.
6-8	18	Chart Your Course—Reading a Navigational Chart	Geog., Math
4-8	19	How the Great Lakes Modify the Growing Season	Sci., Soc. St.
5-8	20	Snowmaking—Great Lakes Style	Sci., Soc. St.
6-8	21	Math Path to the Great Lakes	Math
6-8	22	The Great Lakes Shipping Game	Soc. St., Econ., Math, Geog.
4-8	23	The Gull Game	Sci.
7-8	24	Solving the PCB Problem at Manitou Harbor	Soc. St., Sci.

Subject Area Abbreviations:

Geog. - Geography
Sci. - Science
L.A. - Language Arts
Dr.- Drama

His.- History
Soc. St. - Social Studies
Econ.- Economics

Resources To Order Ahead

Books

Archer, Marion, *Sarah Jane,* Albert Whitman & Co., Chicago, 1972. (Activity #14)

Arnosky, Jim, *Freshwater Fish and Fishing,* Four Winds Press, New York, 1982. (Activity #4)

Bach, Richard, *Jonathan Livingston Seagull,* Avon Books, New York, 1970. (Activity #23)

Barbram, Robert, *Fishing for Sunfish,* Lippincott, New York, 1978. (Activity #4)

Barry, James P., *Ships of the Great Lakes: 300 Years of Navigation,* illus., Howell-North Books, Berkeley, California, 1973. (Activity #18)

Barry, James P., *The Great Lakes,* illus., Franklin Watts, Inc., New York, 1976. (Activity #22)

Bierhorst, John, *Cry From the Earth,* Four Winds Press, New York, 1979. (Activity #9)

Bierhorst, John, *Songs of the Chippewa,* Farrar, Straus and Giroux, Inc., New York, 1974. (Activity #8)

Bowen, Dana Thomas, *Shipwrecks of the Lakes: Told in Story and Picture,* illus., Freshwater Press, Cleveland, Ohio, 1971. (Activity #18)

Boyer, Dwight, *Great Stories of the Great Lakes,* illus., Dodd, Mead and Company, New York,, 1966.(Activity #22)

Boyer, Dwight, *True Tales of the Great Lakes,* illus., Dodd, Mead and Company, New York, 1971.(Activity #22)

Butler, Beverly, *Song of the Voyageur,* Dodd, Mead and Company, New York, 1955. (Activity #9)

Coatsworth, Emerson and David Coatsworth, *The Adventures of Nanabush: Ojibway Indian Stories,* A Margaret K. McElderry Book, Atheneum, New York,1980. (Activity #12)

Cole, Joanna and Jerome Wexler, *A Fish Hatches,* William Morrow and Company, Inc., New York, 1978. (Activity #4)

Eimerl, Sarel, *Gulls,* Simon and Schuster, New York, 1969. (Activity #23)

Ellis, William Donohue, *Land of the Inland Seas: The Historic and Beautiful Great Lakes Country,* American West Publishing Company, Palo Alto,California, 1974. (Activity #14)

Emerson, Laura S., *Storytelling: The Art and the Purpose,* Zondervan Publishing House, Grand Rapids, Michigan, 1959. (Activity #8)

Engler, Larry and Carol Fijan, *Making Puppets Come Alive,* Taplinger Publishing Company, Inc., New York, 1973. (Activity #5)

Erickson, Charlotte, *Invisible Immigrants: The Adaptation of English and Scottish Immigrants in 19th Century America,* University of Miami Press, Coral Gables, Florida, 1972. (Activity #14)

Felton, Harold W., *Legends of Paul Bunyan,* Alfred A. Knopf, New York, 1961. (Activity #12)

Fletcher, Alan, *Fishes and Their Young,* Addison Wesley, Reading, Massachusetts, 1974. (Activity #4)

Freedman, Russell, *Immigrant Kids,* E. P. Dutton, New York, 1980. (Activity #14)

Hanford, Robert Ten Eyck, *The Complete Book of Puppets and Puppeteering,* Sterling Publishing Co., Inc., New York, 1976. (Activity #5)

Holling, Holling Clancy, *Paddle-to-the-Sea,* Houghton Mifflin Company, Boston, 1941. (Activity #10)

King, B. A. and Jonathan Ela, *Faces of the Great Lakes,* Sierra Club Books, San Francisco, California, 1977. (Activity #2)

Lin, Leslie, Paul Nowak and William Stayz, "What it Takes to Catch a Fish," from *Great Lakes Fishing in Transition,* Michigan Sea Grant, University of Michigan, Ann Arbor, Michigan, 1979. (Activity#4)

Lomax, Alan, *The Folk Songs of North America,* Doubleday and Company, Garden City, New York,1960. (Activity #7)

Lyford, Carrie A., *Ojibwa Crafts,* Bureau of Indian Affairs, U.S. Dept. of Interior, Washington, 1943. (Activity #8)

May, Julian, *Moving Hills of Sand,* Hawthorn Books, Inc., New York, 1969. (Activity #2)

Nute, Grace Lee, *The Voyageur,* D. Appleton & Company, New York, 1931. Reprinted 1955 by the Minnesota Historical Society, St. Paul. (Activity #7)

Pellowski, Anne, *The World of Storytelling,* Bowker Publishing Company, New York, 1977. (Activity#8)

Peters, Harry B., Ed., *Folk Songs Out of Wisconsin,* The State Historical Society of Wisconsin, Madison, Wisconsin, 1977. (Activity #7)

Reid, Dorothy M., *Tales of Nanabozho,* Oxford University Press, Toronto, Canada, 1963. (Activity #12)

Renfro, Nancy, *Puppets for Play Production,* Funk and Wagnalls, New York, 1969. (Activity #5)

Scholastic Book Services, *The Funcraft Book of Puppets,* Ottenheimer Publishers, Inc., Baltimore, 1976. (Activity #5)

Selsam, Millicent, *See Through the Lake,* Harper and Row, New York, 1958. (Activity #4)

Sheppard, Sally, *Indians of the Eastern Woodlands,* Franklin Watts, Inc., New York, 1975. (Activity #9)

Stamm, Douglas R., *Underwater: The Northern Lakes,* photographs and notes, The University of Wisconsin Press, Madison, Wisconsin, 1977.(Activity #4)

Steig, William, *Sylvester and the Magic Pebble,* Windmill Books, E. P. Dutton, New York, 1969. (Activity #3)

Syme, Ronald, *LaSalle of the Mississippi,* William Morrow and Co,. Inc., New York, 1953. (Activity #10)

Tinbergen, Niko and Hugh Falkus, *Signals for Survival,* Clarendon Press, Oxford University Press, England, 1970. (Activity #23)

U.S. Environmental Protection Agency, *Toxic Information Series—PCBs,* Chicago, 1980. (Activity #24).

U.W. Sea Grant Institute, "Fish of Lake Michigan," Madison, Wisconsin, 1974. (Activity #4)

U.W. Sea Grant Institute, "Fish of Lake Superior," Madison, Wisconsin, 1976. (Activity #4)

Weimer, Linda, Warren Downs, Cathy Manson and Peyton Smith, *The ABCs of PCBs,* U.W. Sea Grant Institute, Madison, Wisconsin, 1978. (Activity #24)

Weitzman, David, *My Backyard History Book,* The Brown Paper School Series, Little, Brown, & Co., Boston, 1975. (Activity #14)

Wilder, Laura Ingalls, *Little House in the Big Woods,* Harper and Row, New York, 1953. (Activity #14)

Wilson, Keith, *Fur Trade in Canada,* Grolier, Inc., Danbury, Connecticut, 1980. (Activity #9)

Wright, Dare, *Look at a Gull,* Random House, New York, 1967. (Activity #23)

Zim, Herbert, *Cargo Ships,* William Morrow and Co., Inc., 1970. (Activity #22)

Periodicals

Cobblestone Magazine, Ed. Mark Corsey, Peterborough, New Hampshire, December, 1982, and January, 1983. Activity #14) Order from: *Cobblestone Magazine,* c/o Mark Corsey, Editor, 28 Main Street, Peterborough, NH 03458. Phone (603) 924-7209.

"Food Chain Game," in *Lacustrine Lessons,* Minnesota Sea Grant Extension Program, University of Minnesota-Duluth, November/December, 1980, pp. 3-4. (Activity #4) Order from: Minnesota Sea Grant Extension Program, 109 Washburn Hall, University of Minnesota-Duluth, 2400 Oakland Avenue, Duluth, MN 55812. Phone (218) 726-8106.

"Julien, Boy Voyageur," *Badger History, French in Wisconsin,* vol. xxx, no. 1, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, Wisconsin, 1976, pp. 29-31. (Activity #9)

"Nannabush," *Lacustrine Lessons,* Minnesota Sea Grant Extension Program, University of Minnesota-Duluth. November/December, 1982. (Activity #12) Order from: Minnesota Sea Grant Extension Program, 109 Washburn Hall, University of Minnesota-Duluth, 2400 Oakland Avenue, Duluth, MN 55812. Phone (218) 726-8106.

"Web of Life," in *Lacustrine Lessons,* Minnesota Sea Grant Extension Program, University of Minnesota-Duluth, September/October, 1982, pp. 7-8. (Activity #4) Order from: Minnesota Sea Grant Extension Program, 109 Washburn Hall, University of Minnesota-Duluth, 2400 Oakland Avenue, Duluth, Minnesota 55812. Phone (218) 726-8106.

"Wisconsin Folk Songs," by David Peterson, *Badger History, Wisconsin Folklore,* vol. xxvii, no. 2, Ed., Howard Kanetzke, Wisconsin State Historical Society, Madison, Wisconsin, November, 1973. (Activity #7)

Audio/Visuals

Films

"Beach—A River of Sand," 26 min., color, Encyclopedia Britannica Films, 1965. (Activity #2)

"Birds of Shore and Marsh," 14 min., color, Coronet, 1971. (Activity #23)

"Can We Fish Again," 14 min., color, RKO Radio Pictures, 1977. (Activity #24)

"The Great Cleanup," 51 min., National Film Board of Canada, 1976. (Activity #24)

"Great Lakes—Highway of Commerce," 22 min., color, Encyclopedia Britannica Films, 1951. (Activity #22)

"Great Lakes: North America's Inland Seas," 17 min., color, Encyclopedia Brittanica Films, 1971. (Activity #22)

"Map Skills: Using Different Maps Together," 11 min., color, Coronet, 1971. (Activity #10)

"Maps are Fun," 10 min., color, Coronet, 1946. (Activity #10)

"Sand Castle," 13 min., color, National Film Board of Canada, 1977. (Activity #2)

"Sea Adventures of Sandy Snail," 16 min., color, Encyclopedia Britannica Films, 1957. (Activity #4)

"Sea Gull," 10 min., color, AIMS, 1973. (Activity #23)

"Sea Gull," 14 min., color, Coronet, 1968.(Activity #23)

"Sea: Mysteries of the Deep," 23 min., color, Encyclopedia Britannica Films, 1979. (Activity #4)

"Signals for Survival, Part I & II," 50 min., color, McGraw-Hill, 1970. (Activity #23)

"Story of the St. Lawrence Seaway," 13 min., color, McGraw-Hill, 1959. (Activity #22)

"The Voyageurs," 20 min., color, National Film Board of Canada, 1965. (Activity #9)

"Way of a Trout," 29 min., color, James W. Wilkie, 1967. (Activity #4)

"Woodland Indians of Early America," 11 min., color, Coronet, 958. (Activity #9)

"World in a Marsh," 22 min., color, McGraw-Hill, 1958. (Activity #4)

Filmstrips/Slides

"Minnesota's World Port," 15 min., color, Upper Midwest Filmstrips. (Activity #22) Order from: Upper Midwest Filmstrips, 409Lakewood Road, Duluth, MN 55804.

"The Northern Lakes and Their Inhabitants," Audio-visuals and Software for Creative Teaching, Educational Images Limited, Lyons Falls, New York 13368. (Activity #4)

Records

Rogers, Stan, "From Fresh Waters," Fogarty's Cove Music, Inc., 1983. (Activity #7). Available in record stores or write: Valerie Rogers, Woodburn Road, RR 1, Hannon, Ontario, Canada, L0R 1P0.

Maps

"Catalog of Nautical Charts and Related Publications for the Great Lakes," Catalog #3, Hydrographic Chart Distribution Office, Ottawa, Ontario. Order from: Hydrographic Chart Distribution Office, Dept. of Fisheries and the Environment, 1675 Russell Road, P.O. Box 8080, Ottawa, Ontario, KLG8H6. Phone (613) 998-4931. (Activity #18)

"Catalog of Navigational Charts for the Great Lakes," Catalog #4, National Ocean Survey, Riverdale, Maryland. Order from: U.S. Department of the Army, Lake Survey District, Corps of Engineers, Distribution Division (OA/C44), National Ocean Survey, Riverdale, MD 20737. Phone (301)436-6990. (Activity #18)

"Close-up: USA, Wisconsin, Michigan and the Great Lakes," National Geographic Society, Washington, D.C. Order from: National Geographic Society, P.O. Box 1269, Washington, D.C. 20013. Phone (800)368-2728. (Activity #18)

"Colonization and Trade in the New World," National Geographic Society, Washington, D.C. Order from: National Geographic Society, P.O. Box 1269, Washington, D.C. 20013. Phone (800) 368-2728. (Activity #10)

"Great Lakes from Lake Champlain to Lake of the Woods," Chart #14500, National Ocean Survey, Riverdale, Maryland. Order from: U.S. Department of the Army, Lake Survey District, Corps of Engineers, Distribution Division (OA/C44), National Ocean Survey, Riverdale, MD 20737. Phone (301)436-6990. (Activity 22)

"Navigational Chart Symbols and Abbreviations," Chart #1, National Ocean Survey, Riverdale, Maryland. Order from: U.S. Department of the Army, Lake Survey District, Corps of Engineers, Distribution Division (OA/C44), National Ocean Survey, Riverdale, MD 20737. Phone (301) 436-6990. (Activity #18)

"Ontario Province black and white LANDSAT Mosaic, 1:2, 500,000," Canada Map Office, Ottawa, Ontario. Order from: Canada Map Office, Surveys and Mapping Branch, 615 Booth Street, Ottawa, Ontario K1A 0E9. (Activity #17)

"St. Mary's River, Lake Huron to Lake Manuscong," Chart #14882, National Ocean Survey, Riverdale, Maryland. Order from: U.S. Department of the Army, Lake Survey District, Corps of Engineers, Distribution Division (OA/C44), National Ocean Survey, Riverdale, MD 20737. Phone (301)436-6990. (Activity #18)

"Sheet D (Wisconsin) Mosaic of LANDSAT Imagery of Coterminous U.S., 1:1,000,000," Aerial Photo Field Office, Salt Lake City, Utah. Order from: Aerial Photo Field Office, AFCS-USDA, 2222 West 2300 South, P.O. Box 30010, Salt Lake City, UT 84125. (Activity #17)

"Sheet E (Michigan) Mosaic of LANDSAT Imagery of Coterminous U.S., 1:1,000,000," Aerial Photo Field Office, Salt Lake City, Utah. Order from: Aerial Photo Field Office, AFCS-USDA, 2222 West 2300 South, P.O. Box 30010, Salt Lake City, UT 84125. (Activity #17)

Curricula

"Cobbler's Cove" (simulation), New York State Sea Grant, East Aurora, New York. Order from: N.Y. State Sea Grant, 21 South Grove Street, East Aurora, NY 14052. (Activity #24)

"Furs" (computer simulation) MECC (Minnesota Education Computing Consortium), Lauderdale, Minnesota. Order from: MECC Publications, 2520 Broadway Drive, Lauderdale, MN 55113. (Activity #9)

"Odell Lake" (computer simulation), MECC (Minnesota Education Computing Consortium), Lauderdale, Minnesota. Order from: MECC Publications, 2520 Broadway Drive, Lauderdale, MN 55113. (Activity #4)

"Ojibwe and Others," *People of Native Ancestry, Touch a Child Series*, Midnorthern Ontario Region Curriculum Development, Toronto, Ontario. Order from: Midnorthern Ontario Region Curriculum Development, Ontario Ministry of Education, Mowat Block, Queens Park, Toronto, Ontario M74 1L2. (Activity #7)

"Shipping on the Great Lakes," Ohio Sea Grant, Columbus, Ohio. Order from: Ohio Sea Grant, 283 Arps Hall, 1945 N. High Street, Columbus, OH 43210. (Activity #22)

"Shipping: The World Commuters," Ohio Sea Grant, Columbus, Ohio. Order from: Ohio Sea Grant, 283 Arps Hall, 1945 N. High Street, Columbus, OH 43210. (Activity #22)

"Voyageur" (computer simulation), MECC (Minnesota Education Computing Consortium), Lauderdale, Minnesota. Order from: MECC Publications, 2520 Broadway Drive, Lauderdale, MN 55113. (Activity #9)

Activity 1: Getting To Know The Great Lakes

A satellite image, puzzles, a film, a book and a brick help younger students discover the Great Lakes and learn elementary map reading skills through observing, comparing and discussing.

Grades: 1-4
Subject Areas: Geography

Introduce your students to the beauty, size and importance of the Great Lakes through the medium of the story, *Paddle-to-the-Sea*, and through the "magic" of satellite images and traditional maps.

This activity introduces the map reading skills of scale, perspective and direction.

Procedure

1. Read the book *Paddle-to-the-Sea* to your students. Older children might pass it around a reading group and read it aloud. Talk about the book with your class. Ask:

- What happened to Paddle-to-the-Sea?
- Where was the carved boat traveling?
- What caused Paddle-to-the-Sea's delays? What helped it along?
- Do you think the story could really happen? Why or why not?

2. Show the film "Paddle-to-the-Sea." Discuss the film with your students:

- What is this film about?
- What part do you remember most clearly?
- How is the film like the book?
- Which did you like better? Why?
- Notice the lakes in the film. What words would you use to describe them? What parts of the film do you remember when you use that word?

3. For this introduction to scale and perspective you will need two ordinary building bricks and two buttons (or other small object) of the same size and color.

Show the bricks and buttons to your students. Ask them to observe their size and relationship. Ask:

- How big is the button? The brick? How can you tell?
- How much bigger is one than the other?
- How are the two buttons the same? The two bricks?
- How are the two buttons different? The two bricks?

Ask a student to place one brick and one button on the floor of the classroom. Have the students stand the same distance away from them (about 5 feet). Ask them to estimate the sizes of the two objects. Then have the students move to the opposite end of the room and do the same estimates.

- What happens to the size of the brick when you move away?
- Do you think the brick has changed? Why or why not? Go check.
- What about the button? Has it changed?
- What is different besides the size?
- Has anybody flown in an airplane? How did the houses look on the ground?

There may not be a big enough difference in the sizes of the objects to be observed from front to back of the classroom. If so, do the activity outdoors on the playground, moving far enough away from the objects that their size changes dramatically. (In bad weather the activity can be done in the gymnasium, lunchroom or hallway.)

Depending on your students you may use a student in place of or along with the brick and button. Measure the student's height on the blackboard. Have other students measure how many hands, arms, etc. high she or he appears to be from across the room. Then send the student to the end of the hall or across the playground for a similar measurement. Bring the student back to the mark on the blackboard to verify that he or she hasn't changed size.

4. Distribute copies of the DMSP satellite image of the Great Lakes included in this activity. (For a description of how the image is made, see Activity 17.) Ask your students to find the dark areas and trace the outlines of them with their fingers. Ask:

- What do the shapes of the dark areas make you think of?
- Is anything on this image like anything you remember from *Paddle-to-the-Sea*?

Explain that this is a picture of the Great Lakes taken from very high above the earth in a satellite.

Help students trace Paddle-to-the-Sea's route on the satellite image.

Ask students to take a pen or pencil and make a dot on the image. Now, line everybody up along one wall and start them marching around the perimeter of the room. Walk them around enough times that they are silly and tired (five should do). Explain that the image of the Great Lakes is taken by a satellite flying so high above the earth that they would have to walk around the room a hundred more times just to cover the distance represented by the dot they made on the picture.

The DMSP satellite image covers 3000 kilometers (1860 miles) on the earth in a 25 cm (10 inch) photo. Depending on the size of your room the required number of trips will be more or less. (One dot is about 1/64th inch or 1/2 mm.)

Older students can figure out the exact number of trips around the room required to cover a dot by measuring with meter sticks and millimeter rulers. Similar problems can be developed to see how many trips around the room it would take to cross Lake Michigan, to follow Paddle-to-the-Sea's route, etc.

5. Have each child find an object in the classroom that is larger than a regular piece of writing paper. Pose a problem to the class. If you wanted your mom or dad to know just about how big this object is, how would you do it? Make the problem harder by saying, how would you do it if you couldn't be there to tell them in person, but had to send them a picture with no writing on it?

Take the object out of the room and have your students fill in the blanks:

- My object is bigger than a ____but smaller than a ____.
- The object looks like a ____only ____.
- A rabbit might think my object is ____and would have to look ____to see it.
- A ____would have to look *down* to see my object.
- A ____would have to look *up* to see my object.

6. Ask students:

- If someone wants to know how to get to the drinking fountain (or some other school) how do you direct them?
- How do you tell them if you can't see the place they're going from where you're standing?

Explain that maps are a way of telling people how to get from one place to another and they need points of reference and landmarks too. Ask students to develop a set of reference points for your classroom. Pick a location in your classroom. Have students write directions on how to get from the front door to that location using the landmarks they decided upon.

Now, look at the outline map of the Great Lakes included in this activity. Ask:

- What do you see on this map?
- Are there any pointers or landmarks on this map?
- How are they named?
- With your finger or colored pencil show a spot that is as far south as you can go on the map; as far north; as far east; as far west.

Give students a compass and have them label North, South, East and West on the wall in your classroom. Ask students to make new points of reference for their classroom maps that use north, south, east and west.Have students guide each other from the front door to the same location that they used previously.

- Which directions—using landmarks or N-S-E-W directions—were easier to follow? Why?
- Which might be easier if they were on the lakes? Why?

Ask students to turn their Great Lakes maps so the pointers on the map match the directions on the classroom walls.

- Which direction is your house from here? Some other landmark?
- If you walked out of school and followed the pointer due north, would you run into a lake? Which one?
- What if you went east? West?
- Follow the route of Paddle-to-the-Sea. Which direction did he travel first?

7.Distribute copies of the individual lake outlines included in this activity. For younger students ask them to color the lakes. By comparing the outlines on individual sheets to the outline map or satellite image, ask students to place the individual lake outlines in correct position to each other, just as they would work a jigsaw puzzle. Ask them to put directional pointers on each lake. Then let them cut out the outlines and try to place them in relation to each other without referring to the other map.

Older students can make the problem more difficult by setting up time contests to see how fast they can get the lakes into place. Ask:

- What things do you look at to help you put the lake into their places?
- What parts confuse you?
- How can you make the puzzle easier?

- What can you add to your pictures to help put them into place?
- How can you remember what your additions mean?
- What images or happenings from *Paddle-to-the-Sea* do you want to add to these pictures?

8. Pretend you are in a boat like Paddle-to-the-Sea. Tell a story about part of your trip on the lake.

Resources:

Books

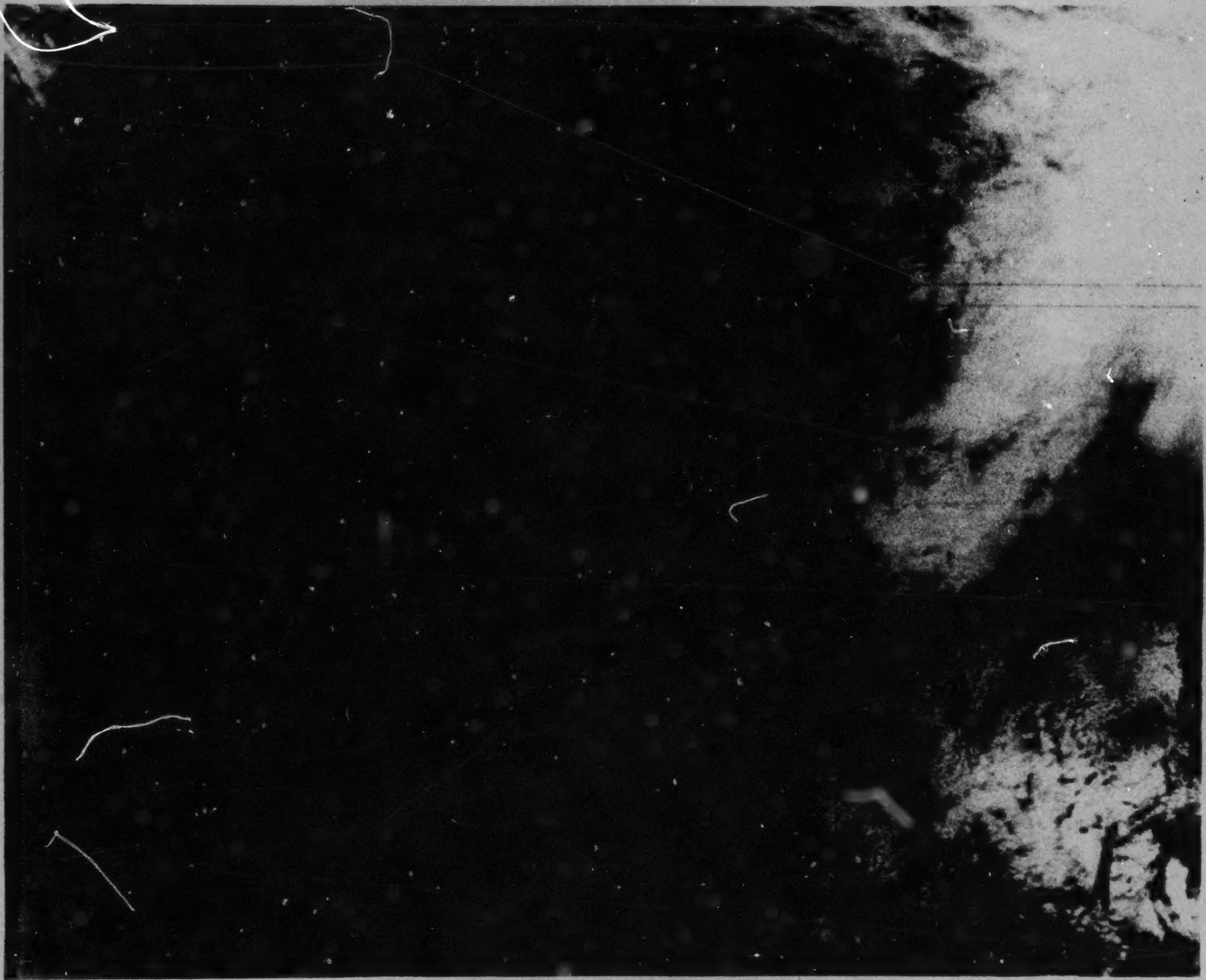
Holling, Holling Clancy, *Paddle-To-The-Sea*, Houghton Mifflin, Boston, 1969. The now-classic story of the carved wooden canoe with an Indian figure is the best book for young children on the Great Lakes for several reasons. It is beautifully written, very descriptive and exciting. By following Paddle the reader learns about the geography of the Great Lakes, the plant and animal life, a little history, jobs such as lumbering and fishing, and storms and forest fires. Wonderful to read aloud with many opportunities to learn from the pictures.

Films

"Paddle-to-the-Sea," 28 min., color, National Film Board of Canada, 1967. Relates the journey of a hand-carved toy canoeman from the northern forest downstream to the distant sea. Shows the many adventures which occur during this journey—a watersnake slips across the bow, a frog finds safety from a pike; in busier waters Paddle sails beside huge ships, survives a plunge down the Niagara cataract; finally *Paddle-to-the-Sea* makes its way to the Atlantic Ocean.

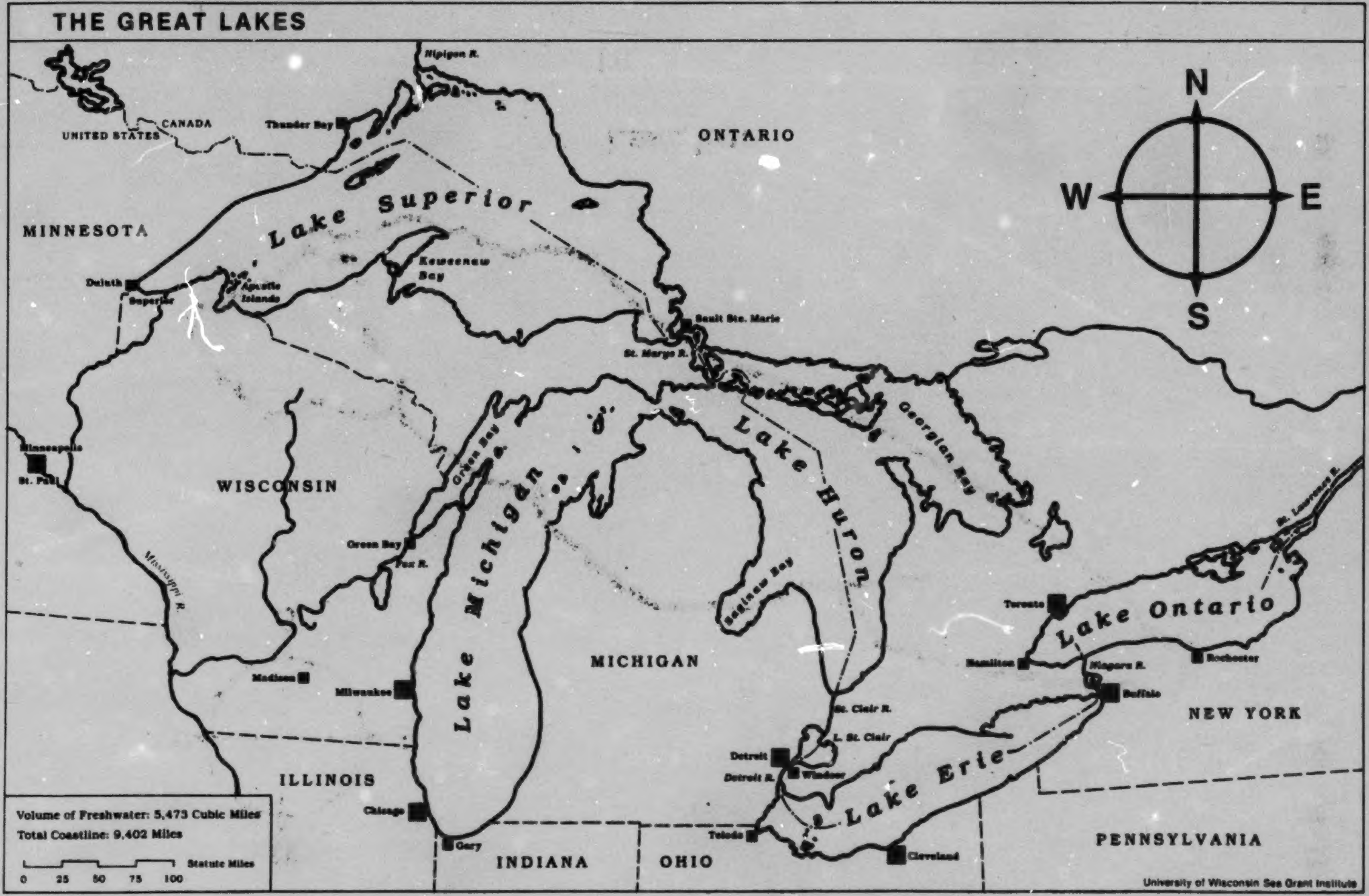
"Maps of Our School," 11 min., color, Bailey, 1965. Shows three aspects in developing map reading concepts: size relationship, symbols, and direction. Illustrates children mapping their classroom and school, and introduces use of compass and the cardinal points. Stresses the importance of both words and symbols in map reading. (Primary)

"Maps Show Our Earth," 10 min., color, Coronet, 1973. Views a boy and his father as they study maps and a globe to trace the route of a business trip. Relates map symbols to actual geographical scenes and comments on the kinds of information different maps provide. Discusses directions on maps, colors and symbols. (Primary and Intermediate)



DMSP Satellite Visual Image—Great Lakes Region—October 20, 1978

THE GREAT LAKES

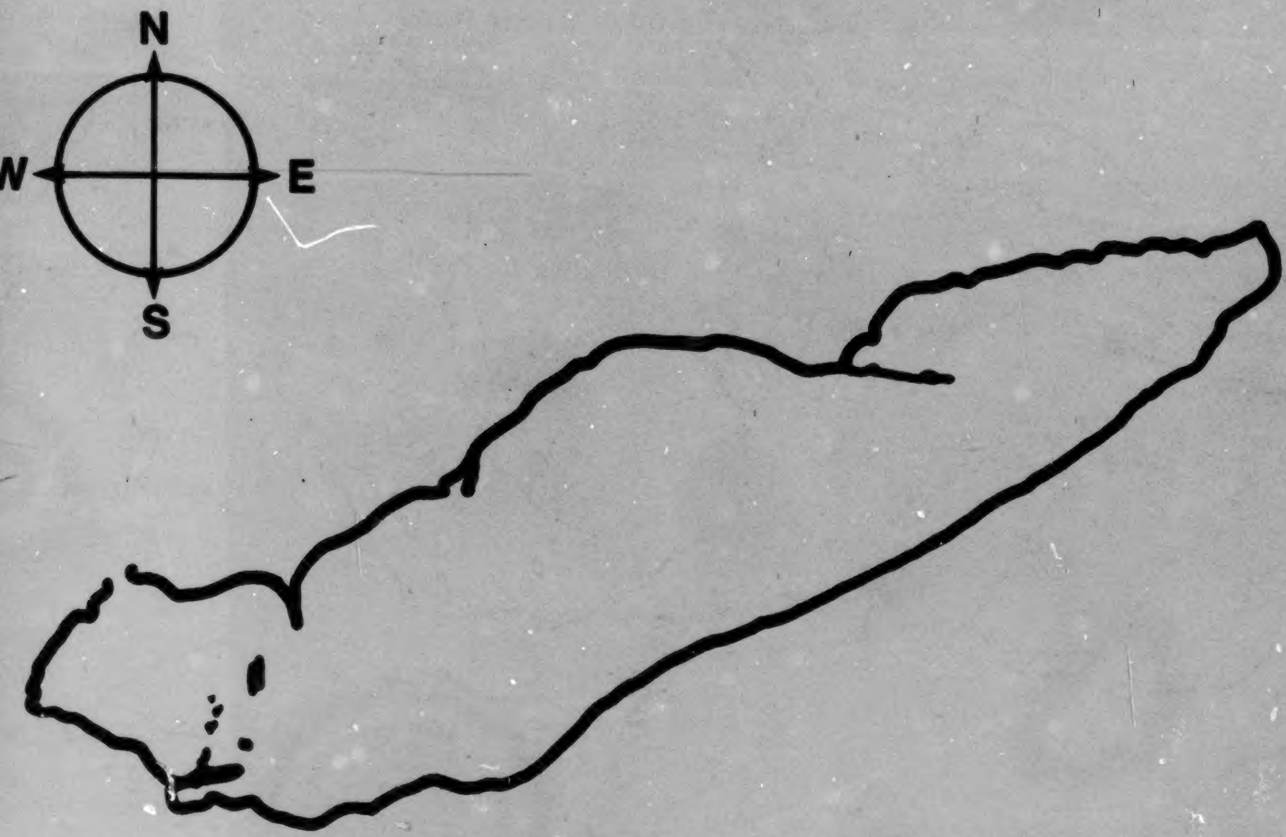

Nipigon R.
Thunder Bay
CANADA
UNITED STATES
ONTARIO
N
W
E
S
MINNESOTA
Lake Superior
Keweenaw Bay
Duluth
Superior
Apostle Islands
Sault Ste. Marie
St. Marys R.
Minneapolis
St. Paul
WISCONSIN
Green Bay
Lake Huron
Georgian Bay
Green Bay
Fox R.
Mississippi R.
Lake Michigan
Saginaw Bay
St. Lawrence R.
Toronto
Lake Ontario
Hamilton
Rochester
Niagara R.
Buffalo
Madison
Milwaukee
MICHIGAN
St. Clair R.
L. St. Clair
NEW YORK
Detroit
Detroit R.
Windsor
Lake Erie
ILLINOIS
Chicago
Gary
Toledo
Cleveland
INDIANA
OHIO
PENNSYLVANIA
0
25
50
75
100
Statute Miles

Volume of Freshwater: 5,473 Cubic Miles

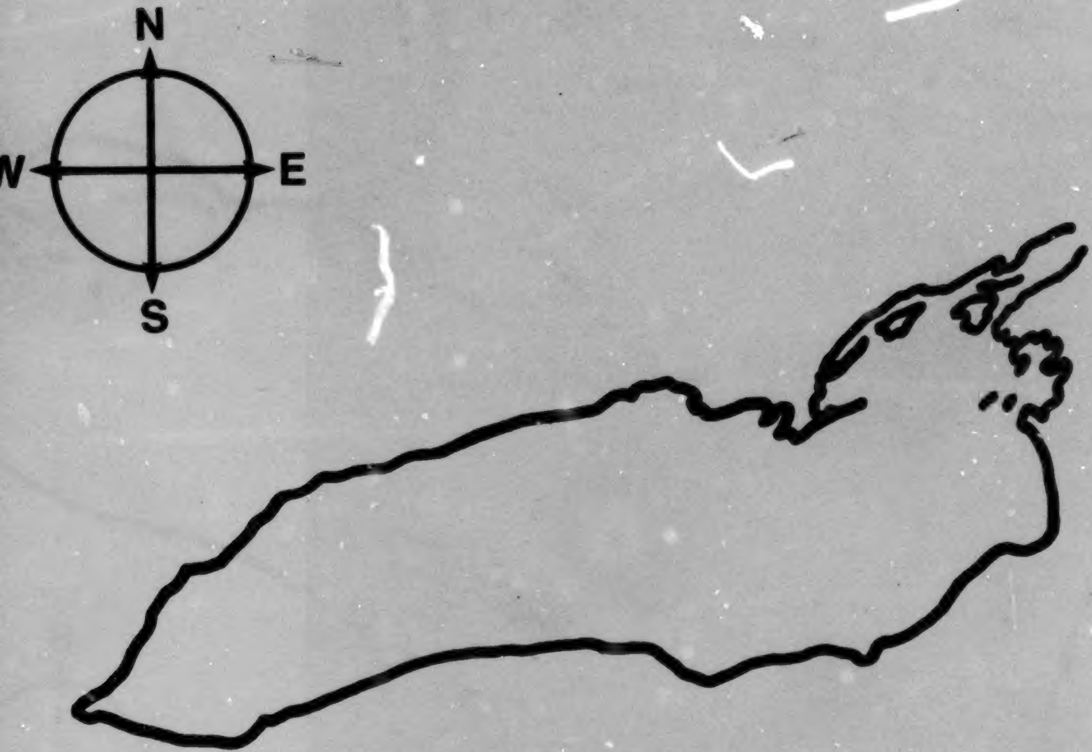
Total Coastline: 9,402 Miles

University of Wisconsin Sea Grant Institute

BEST COPY AVAILABLE

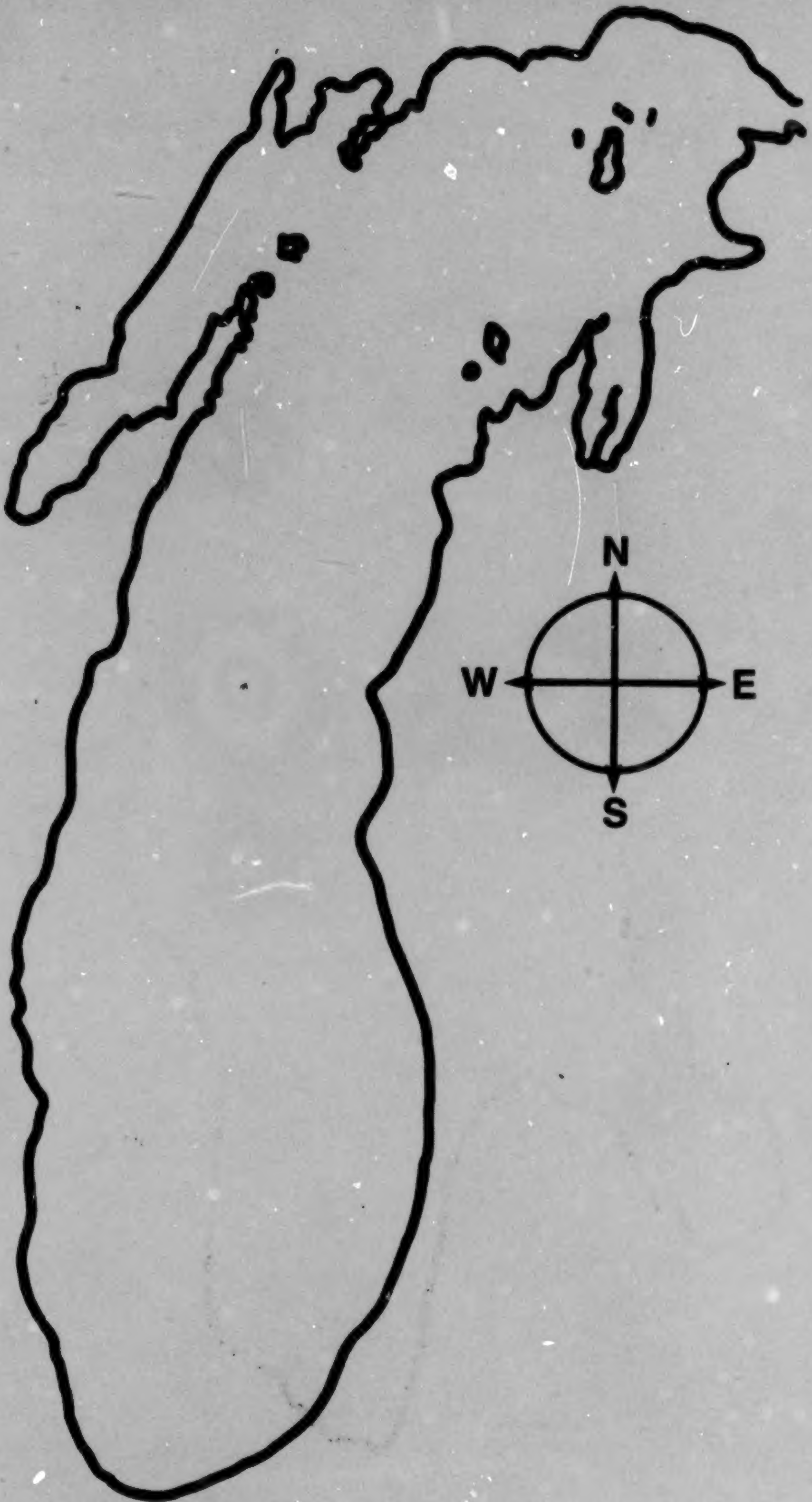


Lake Erie

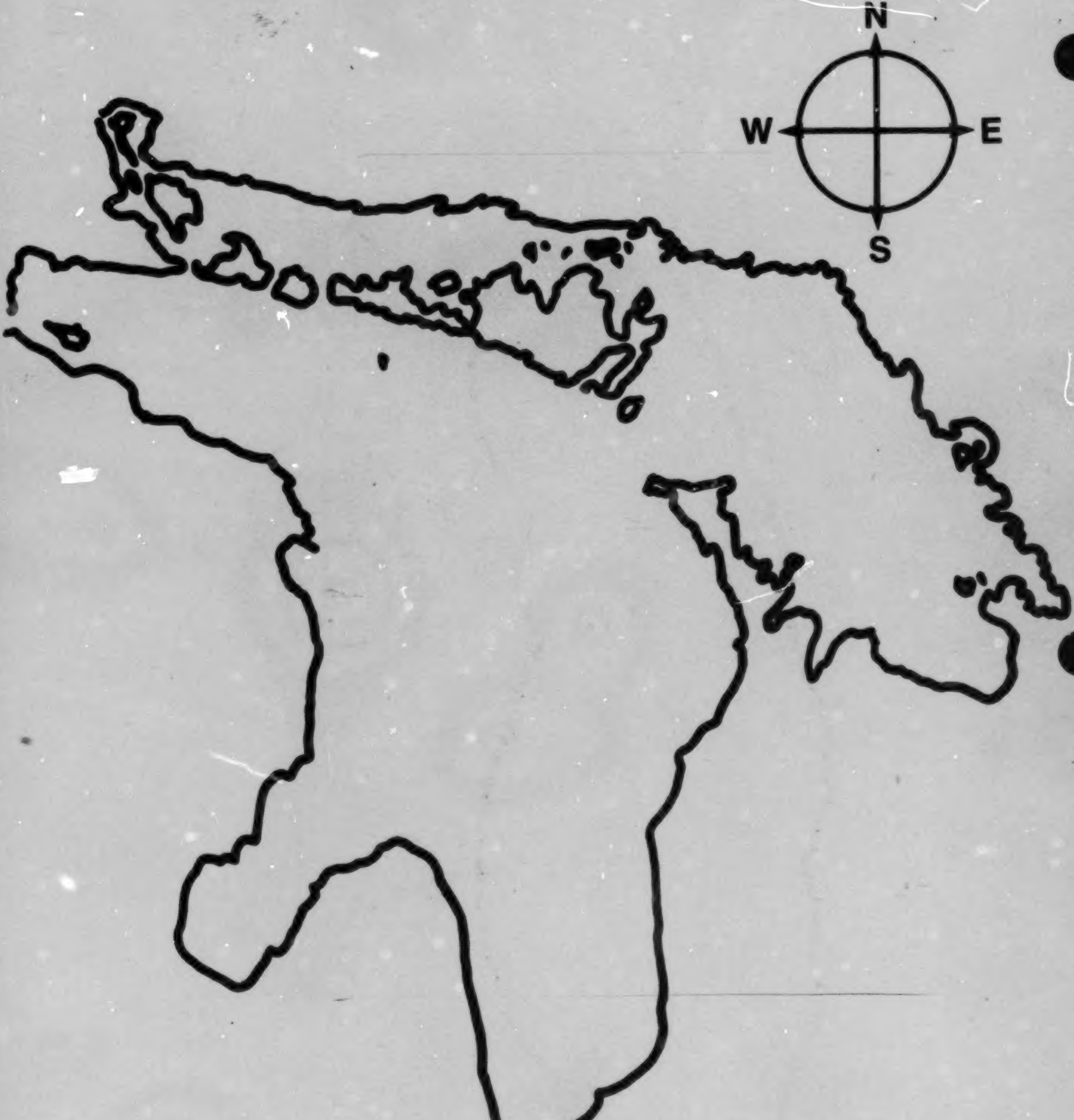


Lake Ontario

Lake Superior



Lake Michigan



Lake Huron

Activity 2: What Is Sand?

Sand is an important physical element of the Great Lakes. In this activity, younger students explore sand by observing, comparing, predicting, inferring and communicating.

Grades: K-2
Subject Areas: Science, Art, Language Arts

Everybody has played in a sandbox, but where does sand come from? This activity introduces younger children to the characteristics of sand and experimenting on how it is formed. Optional film, field trip and bulletin board activities show sand in its natural setting.

Sand is formed by the breakdown of rocks or other materials. Weather processes - freezing and thawing, wind, rain and snow - help break rocks apart. Water in streams and rivers or lakes moves rocks against each other, further breaking them down and rounding their sharp edges. Beaches, like those along the Great Lakes, are excellent locations for making sand. The constant wave action speeds the breakdown process.

In the Great Lakes region the typical color of sand is white or light brown. This is due to the fact that sand particles are primarily quartz, the hardest component of granite, a primary bedrock in the region. In other areas of the world sand may be other colors. In Hawaii and Alaska, for example, sand is black because it is broken down from volcanic rock. In Florida, the bright white sand comes from the breakdown of coral and sea shells.

Sand is moved by water in streams. Sand and gravel deposits which are excavated for buildings and roads may have been left by rivers or streams, some of which no longer exist. Sand dunes, such as those found along the coasts of Lake Michigan, are part of a dynamic beach system that is constantly shifting and moving with the wind and waves.

Sometimes when sand settles into a location other elements will seep into it causing it to stick together again and form sandstone. These elements may be silt, calcium carbonate or iron carbonate from eroding rocks. Depending on how it is formed, some sandstone sticks together tightly while other sandstone can be crumbled easily in the hand. Sometimes sandstone can be seen where road builders have cut through a hill and left the underlying rock exposed. The typical light brown color and the existence of sand at the base of the cuts are clues to whether the rock is sandstone.

Procedure

For the activities in this section you will need the following equipment and materials:

sand
sandstone*
rocks
sand table (or sandbox, or rectangular pans)
2 or more small coffee cans with lids pail
2 plastic containers or cups of the same sizepencils
white paper
balancing device (simple balance board or scales made of clothes hanger and two tuna cans)
white plastic spoons
magnifiers
garden sprinkling can
soil

*Sandstone exists naturally in many places (see preceding description). However, if you are unable to locate any friable (easy to break down) sandstone for this activity, make some by mixing sand box sand with flour and water paste. Drop lumps on a metal cookie sheet and let dry overnight.

1. Provide a pail of sand. Have each child take a plastic spoon full of sand and pour it onto white paper. Have them rub their hands over it. Ask:

- How does it feel? Does it feel like anything else you know?
- Close your eyes and rub your sandy hands together. Does the sand move between your hands? Does it stick together and form a clump?
- Smell the sand. What words come to mind when you smell it?
- Look at the sand. How many different colors can you find? What are they?
- Can you find some grains that are shiny? dull, smooth? rough? Find a large grain? small one.
- Draw what sand looks like.

2. Have students look at the sand through a magnifier. Ask:

- Are all the grains the same size?
- Are all the grains the same shape? The same color?
- Are the sand grains round or sharp-edged?
- How does the magnifying glass change the way you see things?
- Draw what sand looks like under a magnifying glass. Compare it to your other picture before using a magnifier.

3. Have the children brush most of the sand off the paper and find one single grain by itself. Ask:

- Is the grain bigger than a pencil dot? Smaller than a dot?
- Can you think of anything smaller than a grain of sand?

4. Smear a tiny amount of garden soil on the paper next to the sand. Have students look at the soil.

- How are they alike? List three ways they're alike.
- How are they different? List three ways they're different.
- Can you see individual grains of soil?
- Are they bigger or smaller than grains of sand?

5. Place stones in two or more coffee cans. Add a piece of sandstone or one of the lumps of sand you made. Organize a relay race in which children shake the can of rocks the whole time they are running. At the end of the race pour the contents of the can onto a piece of white paper. Ask:

- What happened to the rocks while you were racing?
- Where do you think the sand came from?
- How might sandstone have been formed?
- What makes the sandstone become sand again?

To stimulate your students' imaginations, have them brainstorm ideas and create a story about how the sand grain got so small, where sand comes from, what happened to a particular grain (how it got its sharp corners smoothed out), or a similar topic.

Invite children to make "sandstone" using flour and water paste. A thicker paste should allow students to shape their sandstones.

6. Fill two same-size plastic cups to the same level, one with sand and one with water. Ask students to guess which might be heavier. Have them pick up first the water container, then the sand container. Ask:

- Which feels heavier?
- Which feels lighter?
- How can you find out for sure?

7. Using a simple balance (balance board or clothes hanger with containers attached to ends), have students compare the weight of sand with other things to be found around the classroom.

- Count how many items (like chalk pieces or other objects) balance a portion of sand.
- Ask what students can do to make the sides even (down side up or up side down).
- Balance similar amounts of sand and garden soil, sand and water.

8. Fill a pail or several glasses or jars with water. Let students pour sand into the water and watch it settle. Ask:

- What happened to the sand?
- Can you guess why?

9. In a sand box have students make a hill of sand. Using a garden sprinkling can, gently sprinkle water on top of the hill. Ask:

- What happended to the sand when water ran over it?
- What do you think will happen if we pour a lot of water all at once? (Do it and ask for descriptions.)
- Where does the sand go that was at the top of the hill?

10. Have your students examine the wet sand. Ask:

- Does it feel/smell the same as dry sand?
- Does it look the same? How is it different?

Other Activities with Sand

1. Writing in sand - Smooth the sand in sand table. Have your students write numbers and letters in dry sand. Wet the sand again and have them write numbers and letters in it. Talk about the difference. Which can they read more easily? Why?

2. Sand castings - Suggest that your students make sand castings of handprints, found objects, etc., using plaster of paris and empty milk cartons to form the sides.

To make sand casting you need plaster of paris, water and a sandbox. Smooth out an area in the sand and form edges around it with an empty carton with two long sides cut out. Anything which can form a stiff temporary side without leaking can be used. Make the handprint design in the sand or press the found objects into the sand. Pour quick-setting plaster of paris over the shape about 1/2 inch (12 mm) deep or deep enough to embed the object firmly. If it is too deep it will take a long time to dry. Let the plaster set according to the directions on the package. Take the castings inside to dry thoroughly. See craft books for how to make sand-cast candles.

3. Sand pictures - Have your students squirt glue on cardboard in designs. Pour sand over. Let dry and dump excess sand off.

4. Collect sand from around the world. If you have a nearby beach take your students on a trip there to collect sand. Spread a thin layer of sand over a square of clear adhesive-backed paper. Put a frame around it and put it on the bulletin board with a world map showing where it was collected. Write to schools in places like Hawaii, Alaska, Florida, New Jersey or wherever oceans or lakes are likely to form sand. Send along a sample of your sand and ask to receive some in return. When the samples come in, have your students mount them on their bulletin board.

Taking It Further:

Help your students connect sand to its natural context by:

- talking about trips to a beach,
- bringing family snapshots or pictures from magazines of beach scenes,
- taking a field trip to a beach and bringing back sand for display,
- taking a field trip to a sand pit (check phonebooks for local sand and gravel quarries), and showing a film, books or slides showing sand beaches and dunes.

Resources:

Books

May, Julian, *Moving Hills of Sand*, Hawthorn Books, Inc., New York, 1969.

King, B.A. and Jonathon Ela, *Faces of the Great Lakes*, Sierra Club Books, San Francisco, California, 1977. This book is written for adults, but is filled with beautiful color and black and white photographs of the entire Great Lakes region. The pictures can be shown to children in a group or individually.

Films

"Sand Castle," 13 min, Color, National Film Board of Canada, 1977. Animates the fable about magical creatures who build a sand fortress to protect themselves from a storm. Shows the sand storm interrupting their celebration and sweeping their home away. Includes a musical accompaniment. A 1978 Academy Award winner by filmmaker Co Hoedman. (Suitable for primary through adult audiences)

"Beach - A River of Sand," 26 min, color, Encyclopedia Britannica Films, 1965. Analyzes the currents produced by waves (documented by underwater photography) and calculates the accumulation and depletion of sand (produced by jetties) to discover that the most pronounced movement of sand on a beach is usually along the shore. (Suitable for intermediate and junior high audiences. Teacher may wish to preview to see if it is useful with primary audiences.)

Activity 3: Rocking Around

In this activity students collect and compare rocks and observe them moving with wave action. It can be paired with Activity 2, "What is Sand?"

Grades: K-3
Subject Areas: Science, Art, Language Arts

Anyone who has walked a Great Lakes beach has made friends with rocks. They come in reds, greys, greens, black with speckles, brown with white lines and dozens of other colors and mixtures. Most have smooth sides and rounded corners. Flat ones are especially good for skipping across the water with a side-arm throw.

Pebble, stone or "skipper," they are all rocks to the geologist - "an aggregate of minerals." Smaller rocks are broken down from large geologic formations by the action of weather and water. When the giant ice formations called glaciers covered the Midwest 20,000 years ago, they picked up and carried rocks of all sizes. Giant boulders and tiny pebbles moved over the land with the glaciers.

When summer heat melted portions of the glaciers, the streams of water carried loosened rocks away and piled them along the water's path. This explains why many rocks found around the Great Lakes region are from geological formations many miles north. The glaciers carved the basins of the Great Lakes and water from their melting ran into the basins and helped fill them. This water carried along the rocks and sand that cover the lake bottoms and beaches.

By watching waves at a beach we can see rocks being picked up and rolled over each other again and again. Wave action helps polish rocks and make them round. It helps grind larger rocks into small pebbles and finally into tiny sand grains.

This activity introduces younger children to the characteristics of rocks using various observational techniques. A simple model shows wave action. Optional activities show rocks in their natural settings and display the unique characteristics of rocks.

Procedure

For the activities in this section you will need the following materials:

magnifying glasses
assorted rocks
drawing paper and pencils/crayons
sand
dish pan or other basin

1. Have students collect rocks together at school on the playground. Make a trip to a nearby beach, a gravel pit or some other source. Make sure the rocks are not all the same type and size. Collecting the rocks might be fun for your students and their parents to do together as well.

2. Each child may select several rocks. Ask them to sort rocks by size. Ask:

- What words can you use to describe the rocks in this group of rocks?
- Which is a heavy rock? (or some other *one* characteristic)
- Show me a rock which is rough and dark-colored. (or *two* other characteristics)
- Show me a rock with *three* colors in it (or three other characteristics)

Ask your students to sort the rocks in ways other than by size.

3. Have each child select 2 rocks. Ask:

- How are these two rocks different? List three ways.
- How are they similar? List three ways.
- What color is the first rock? Second rock?
- Which rock is bigger? Heavier? Smoother? Rougher?
- Pick one rock. What makes this rock special to you?

4. Have the children return "their" rocks to a sack with all the other rocks. Mix rocks up and spread them in a pile on the table. Have your students try to find their own rock. (You may want to put the child's initials on the bottom of the rock with ball point or marker to help varify the identification.)

5. Have the children take their rocks back to their desks and look at them with a magnifying glass. Have them compare their rocks to another under the magnifying glass. Ask:

- How are they similar? List five ways.
- In what ways are they different? List five ways.

Give *each child* a small amount of sand and help him/her to isolate one or two grains and look at it through the magnifier. Ask:

- Tell us three ways that the sand grain is similar to your rock.
- Tell us three ways that they are different.

6. Have students draw a picture of their rocks.

7. Make a simple wave tank. Take a dish pan or other basin with relatively deep sides. Have students heap sand and small rocks at one end of it. Add one or two inches of water, enough to move around, but not so much as to submerge your rock and sand pile. Lift the end opposite the "beach" gently up and down so "waves" move the rocks and sand. Ask:

- What's happening to the rocks?
- What's happening to the sand?
- Why do they respond differently to the wave?
- Have you ever been to a beach at a lake? How is this like that? How is it different?
- Imagine what it feels like to be a rock or grain of sand in the wave. (Optional: Have students do a creative dramatics exercise in which some are waves and some are rocks and sand. Have them show the movements.)

8. Have children create a story about how the rock got its shape, color, etc. What other things beside a rock does it look like? Tell a story about that. For younger children (kindergarten and first grade) you may wish to read the story *Sylvester and the Magic Pebble* before or after they make up their own stories.

Other Activities With Rocks:

1. Have students glue small rocks to cardboard to form a mosaic or picture.

2. Help students create their own rock critter by painting faces, gluing eyes, adding pipe cleaner "feelers", etc.

3. Paint scenes on flat rocks.

Taking It Further

1. Put rocks into their natural context by:

- Taking a field trip to a beach or rock quarry.
- Showing pictures of Great Lakes beaches.
- Having students bring in pictures from magazines or snapshots showing beaches with rocks.
- Taking a field trip to a local rock collection or museum.

2. Plant a rock. Place a rock outdoors on the playground. Observe its surroundings. Draw a picture. Go back and observe it after 3 months, 6 months and 9 months. Look at the rock when it rains and compare it with your original picture. Look at the rock after it rains. What do you notice? Have your students keep a daily log to record changes in their rock and its surroundings.

Resource:

Books

Steig, William, *Sylvester and the Magic Pebble*, Windmill Books, E.P. Dutton, New York, 1969.

Activity 4: Voyage To The Bottom Of The Lake

Imagination is all it takes to reach the bottom of a Great Lake. This activity teaches how fish and other creatures survive while it exercises the skills of imagining, observing, manipulating materials and inferring.

Grades: 3-6
Subject Areas: Science, Art, Language Arts, Music

Your classroom can be as exciting as the vast realms of outer space or a trip to strange and distant lands. You and your students are about to transform your classroom into the exotic and amazing world under the surface of the lake. Your room can be a resource for the whole school as other classes visit the underwater environment to hear stories and songs that help them understand its unique nature.

Your students will bring different experiences with the Great Lakes environment to this activity. If you live in a coast community, the students in your class may have been in the water and on the beach since they were old enough to walk. However, many children even in towns just a few miles from a Great Lake may have never seen it.

This activity relies on students exercising their imaginations about the world under water. Students who have no experience with lakes may have difficulty with it. Procedure #1 suggests ways to provide students with some resources for their imaginations. You may also wish to reverse the order of these activities, creating the lake environment in your classroom first, then taking the "Underwater Voyage - A Guided Fantasy."

Procedure

1. Introduce your students to the underwater world. If there is a small lake near your school, take a field trip there. Listen to the sounds, smell the smells, observe the water. If weather, time and school rules permit, wade into the water and look at it through a glass quart jar which is partially submerged.

Ask students if they have ever been swimming in a lake or pool and opened their eyes under water. Ask: What did the water look like? What did the top of the water look like from underneath? What color was the water? What did the light look like? How did things sound?

Several films and slide sets are listed in the Resources section of this activity. You might want to discuss the differences between the marsh, stream and sea environments shown and compare them to the Great Lakes environment. (Fine distinctions are not necessary, but you may want to discourage the idea that sharks live in Lake Michigan.)

If possible, give your students an opportunity to observe fish and other water creatures in a freshwater aquarium. A small school aquarium may be useful. Many zoos have fish tanks and some college and university science departments also have aquatic displays. Encourage your students to observe how light changes in the water and what fish bellies look like from underneath.

Reproduce the drawings of fish and other Great Lakes creatures included in this activity and invite students to color them. Make a transparency of a fish like the Lake Sturgeon and use an overhead projector to enlarge it to life size (3-5 feet) against white paper. Students can trace its outline and color it.

2. Take an "Underwater Voyage" through a guided fantasy. First help students focus on the underwater world by holding a brainstorming session on what they know about it. There's no need to record their responses, just get everybody thinking about what the underwater world might be like.

To enhance this imaginary underwater voyage you may want to help set the scene with sound effects. Music such as "Daphne and Chloe" by Ravel, the sound of water running, sea sounds as reproduced on sound effects records, etc. may add dimension to the experience. Prisms placed on a record player turntable with light playing on them can create the appearance of "bubbles" around the room.

Ask your students to sit quietly with their eyes closed as you read the attached "Underwater Voyage" to them. When the reading is finished, quietly ask them to take art materials - crayons, pencils or paints - and create some view of the underwater scene that they pictured during the story. Try to avoid conversation and other interruptions for at least ten minutes while the students capture their imaginary visit. When the pictures are finished, ask students to discuss their fantasies and show the pictures.

3. Transform your classroom into a Great Lake. Have your students collect pictures and other materials to transform the classroom into the underwater world they imagined. Here are some suggestions to make the classroom look cool, green and wet:

A. Stir your students' imagination with questions like: Would the bottom look the same as the top? What can we do to the windows to make them filter light like water? Try covering the window areas with winterizing plastic. Have students paint on the plastic in blue and green acrylic paint to make the light that comes in look like underwater. (You can also paint directly on the windows with tempera paint mixed with soap flakes. The soap helps make the paint come off the windows and your students more easily.)

B. Cover the bulletin board and wall space with white paper to make a mural around the whole room. Let students plan and paint pictures of their underwater vision.

C. Have your students bring in rocks and shells and convert one area of the classroom floor to a beach. Cover floor with plastic and have students glue sand, rocks, shells, sticks, etc. onto the covering. If you want to discuss pollution of the lakes, add discarded pop cans, plastic 6-pack rings, etc.

D. From the ceiling hang mobiles that dangle fish pictures drawn and colored by your students. Some fish types that "school" near the surface in shallow water are minnows and shiners and alewives. Bigger fish which might excite the students' imaginations are whitefish, trout and salmon. A bottom feeding fish that would be in the deepest part of the lake is the giant 3-5 foot lake sturgeon. It looks like it escaped from a prehistoric monster movie. A large burbot might be seen on the bottom peering out from a rock pile. Crayfish feed on dead fish on the lake's bottom. The lamprey pictured in this activity has a sucking mouth and rows of sharp teeth. They allow it to clamp tightly to the flesh of a trout, whitefish or salmon and suck nourishment from the living fish through a hole it chews in the fish's side. Tiny "freshwater shrimp" are a favorite food of larger fish. Various small and large lake inhabitants can be placed together to show predator/prey relationships.

Less realistic representations of fish can be made using glue, tissue paper, crochet thread and balloons. Coat an inflated long balloon with a solution of 2 parts white school glue and one part water. Cover entire balloon with tissue paper. Dip crochet thread in glue mixture till saturated and wrap around balloon criss-crossing it many times. Cut a tail, eyes and fins from colored paper and glue to balloon.

You may want to have your students decide that one side or corner of the classroom is the deep water and the opposite corner is shallow water or beach. Don't forget to represent the green plant world in the shallow water. Crepe paper cut, stretched and glued to strings then hung from the walls or ceiling can depict rooted or floating aquatic plants. (Few plants will be found in the open lake but they do grow in bays and backwaters.)

The article "Voyage to the Bottom of Lake Michigan" included in this activity can give you background information for helping students create the underwater environment. It is probably too difficult for the students to read themselves. The pictures in *Underwater: The Northern Lakes* by Douglas Stamm can also provide inspiration (see Resources section).

E. Ask students to paint what they would imagine seeing at the surface if they were on the bottom, looking up. These creatures can go on paper or plastic which you then attach to the ceiling.

F. Students can use the "brainstorming" technique described in Activity 24, "Solving the PCB Problem at Manitou Harbor" to plan the various parts of the classroom transformation.

If transforming your entire classroom into a lake would be too disruptive, have your students cover a large table with burlap. For a "porthole" view, your students can cut a few holes along the sides of the material and convert the space beneath the table into a lake scene.

4. Be sure to display the students' original imaginative pictures in one area of the room. Use the environment you've created to inspire a variety of underwater themes.

5. Read books or sections of books like: *See Through the Lake* and others listed at the end of this section. Tell a continuous story to which each child adds a scene as it goes around the room.

6. Have your math problems refer to fish and other underwater creatures. (Example: If 20 alewives were swimming in a school and a coho salmon caught 8 of them, how many alewives would still be swimming in the school?)

7. Sing some of the sailing songs described in Activity 7. Students could make up their own songs about how it feels to be a fish. Children's records may have some fish songs, too.

8. Have students make masks for themselves in the form of various fish or other creatures and then

act out scenes. If bigger fish will be chasing smaller ones, you will want to set up some rules to keep the simulation from collapsing into chaos. For example: 1) Everyone has to crawl on the floor; and 2) Nobody can touch another student. Simulate "capture" by putting a self-adhesive sticker on the "prey's" shirt or some other non-violent means. (See "Food Chain Game" in Resources for a sophisticated predator-prey fish activity.)

9. Act out an underwater scene through creative dramatics. Divide students into groups of 3-6. Pose a problem: Invent a machine which will take you to the bottom of the lake. Give them 10 minutes to figure out what machine they will be, who in the group will represent what part of the machine and how it will get to the bottom of the lake. Then have each group demonstrate its machine to the rest.

10.Use the books and films suggested in the Resources section to help in discussions of how fish protect themselves from predators (moving slowly so as not to attract attention, protective coloration, swimming inside something with an opening too small for bigger fish.) Also talk about how fish breathe and travel underwater. Compare to how people travel and breathe underwater. (If there is a dive shop in your community, invite a representative to come to the classroom and show SCUBA diving equiment. The person may be able to talk about experiences under water in the Great Lakes.)

11. Ask what kinds of things students might expect to find on the bottom of the lake that are not natural. Talk about how these things affect the water in the lake and how the water affects them.

Resources:

Books

Arnosky, Jim, *Freshwater Fish and Fishing*, Four Winds Press, N.Y., 1982.

Barbram, Robert, *Fishing for Sunfish*, Lippincott, N.Y.1978.

Cole, Joanna and Jerome Wexler, *A Fish Hatches*, William Morrow and Co., Inc., N.Y., 1978.

"Fish of Lake Michigan" U.W. Sea Grant Institute, 1800 University Ave., Madison, Wisconsin, 53705, 1974.

"Fish of Lake Superior", U.W. Sea Grant Institute, 1800 University Ave., Madison, Wisconsin, 53705, 1976.

Fletcher, Alan, *Fishes and Their Young*, Addison Wesley, Reading, Mass., 1974.

Lin, Leslie, Paul Nowak and William Stayz, "What it Takes to Catch a Fish," from *Great Lakes Fishing in Transition*, Michigan Sea Grant, University of Michigan, Ann Arbor, Michigan, 1979.

Selsam, Millicent, *See Through the Lake*, Harper and Row, N.Y., 1958. (Book is out of print, but may be in libraries.)

Stamm, Douglas R., *Underwater: The Northern Lakes*, photographs and notes, The University of Wisconsin Press, Madison, WI, 1977.

Films

"Sea Adventures of Sandy Snail," 16 min., color, Encyclopedia Britannica Films, 1957. Presents Betty Ohlorgge, an artist and teacher, who narrates the story while she creates, through the medium of finger paints, the floor of the ocean as it might appear to a tiny snail. Shows Sandy leaving his small aquarium and meeting a starfish, a puffer, a pair of sharks, an abalone and a sea horse. (Primary and intermediate)

"Sea: Mysteries of the Deep," 23 min. color, Encyclopedia Britannica Films, 1979. Photographed from a special observation bubble on the seacraft SSP Kaimalina. Examines some of the inhabitants of the ocean depths. One focus is the hunter-hunted relationship that abounds undersea. Another is the recent but deadly predator that threatens all sea life - human beings and their endless supply of pollutants. (Intermediate and above)

"Way of a Trout," 29 min., color, James W. Wilkie, 1967. Excellent photography and story accurately depict the life cycle of the trout in Wisconsin. (Preview for usefulness; rated for junior high and above.)

"World in a Marsh," 22 min., color, McGraw Hill, 1958. Probes into the life forms that dwell beneath the water's surface and views the creatures that choose the cool green jungle of weeds and swamp lilies for their habitat. (Intermediate and junior high)

Slides

"The Northern Lakes and Their Inhabitants" Douglas Stamm presents the specialized freshwater environment of the forest lakes reaching from Minnesota to Maine along the U.S. - Canadian border. These waters are relatively sterile and harbor relatively few life forms. Surveys the various fish found in the lakes, describes the factors controlling the lakes' productivity and even presents a rare photograph of a thermocline.

(Source: Audiovisuals and Software for Creative Teaching, Educational Images Limited, P.O. Box 367, Lyons Falls, N.Y. 13368. Call 315/348-8211)

Computer Simulation

"Odell Lake" Allows students to role-play fish found in an actual lake in Oregon. They discover food web relationships.

(Source: MEEC-Minnesota Education Computing Consortium- Publications, 2520 Broadway Drive, Lauderdale, MN, 55113.)

Other Activities

"Food Chain Game," in *Lacustrine Lessons,* November/December, 1980, pp. 3-4.

"Web of Life," in *Lacustrine Lessons,* September/October, 1982, pp. 7-8.

(Source: Minnesota Sea Grant, 109 Washburn Hall, University of Minnesota, 2400 Oakland Avenue, Duluth, Minnesota 55812.)

Underwater Voyage-A Guided Fantasy

To The Teacher:

Read this guided fantasy in a quiet voice while your students sit quietly with their eyes closed. Where there are three dots . . . pause for a few seconds to allow the listeners to pursue their images. At the conclusion of the fantasy, use art or discussion to help students fix the images they have created. Follow with a discussion to enable students to express the images they have created. In discussion be sure to ask students to describe feelings and sensory experiences in addition to visual images.

Close your eyes. Relax. Sit comfortably in your seat and prepare to listen for a few minutes. Let your mind quietly follow what you hear.

Imagine that you are a small fish. You are swimming quietly along in the warm, bright water near the shore. Above you is the gently wiggling silver bright sky of the lake's surface. Below you is the brown, rippled sand of the bottom. Swim slowly around. Let the warm water slide over your skin. How does your skin feel? . . . What parts of your body do you feel yourself moving to keep swimming gently along in the water? . . .

Swim deeper now. The water grows cooler and darker. How does it feel on your fish scales? . . . What color is the water around you? Look to the left. Turn your body so you can see clearly. What is that over there near that large rock? . . . Swim closer so you can see better.

Something catches your eye over to the right. Many fish are making a fuss in the water. What do they look like? Are they big or small? What color are they? Can you hear them? Smell them? . . . What do you do - go closer and join them or run away? . . . What happens? . . .

Look down below. There is a shadow of brown and green. It looks just like a tree branch, one among many. Another small shiny fish like you swims close by that shadow.

Watch out! Too late. That shadow was a walleye, and the shiny fish became its lunch. How do you feel? What do you do? . . .

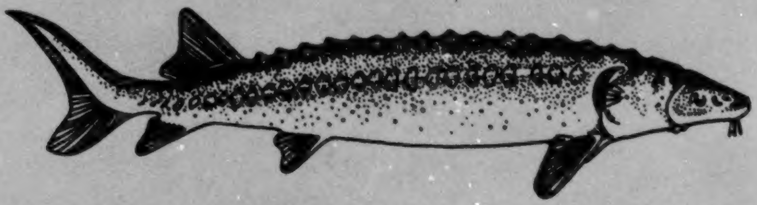
Slide down toward the bottom of the lake. Swim past that wrecked ship, its wooden pieces covered with green algae. Settle down in the sandy mud at the bottom of the lake. How does it feel? . . . Look around. Can you see anything else? . . . What color is the water?

Move ahead to a rocky slope that rises toward the surface Swim quietly along it. Trout use these rocks for laying eggs. Feel the water get warmer as you come up. Feel the parts of your body that move as you swim. Look at the surface of the water, your shiny, wet ceiling.

How do the colors and light change as you look up, then down, then up again? . . . What do you see floating on the top of the water as you come close to the surface? . . . Swim slowly around, returning to the warm, sunny place where you started. Think about your journey, . . . and then when you are ready, open your eyes and return to this room. . . .

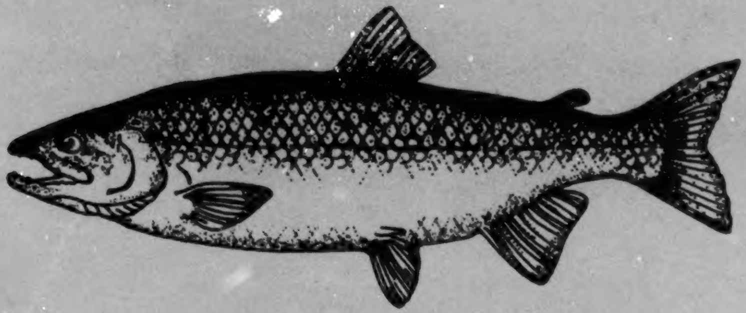
Teacher:

Watch the class and keep distractions to a minimum for 30 seconds to a minute while all participants complete their imaginary journey. Then, still speaking in a quiet voice, move to the next part of the activity, the art or discussion.



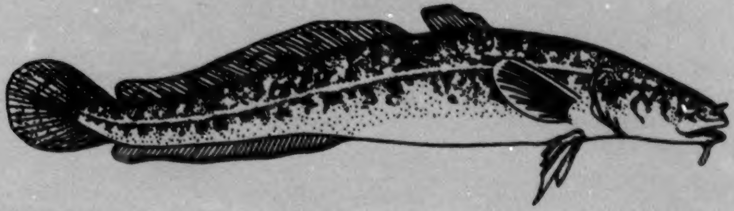
LAKE STURGEON

Acipenser fulvescens
length: 3-5 feet
weight: 10-80 pounds
coloring: olive-brown to grey on back and sides; white belly
common names: freshwater sturgeon, rock sturgeon, bony sturgeon, smoothback



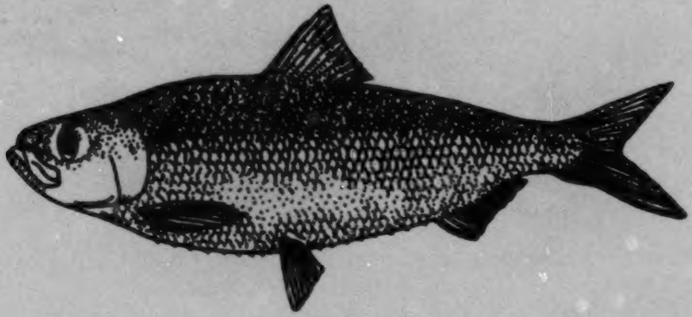
LAKE TROUT

Salvelinus namaycush
length: 17-27 inches
weight: 3-9 pounds
coloring: light spots on darker background; light underside
common names: Great Lakes trout, laker, namaycush, togue, grey trout, mountain trout



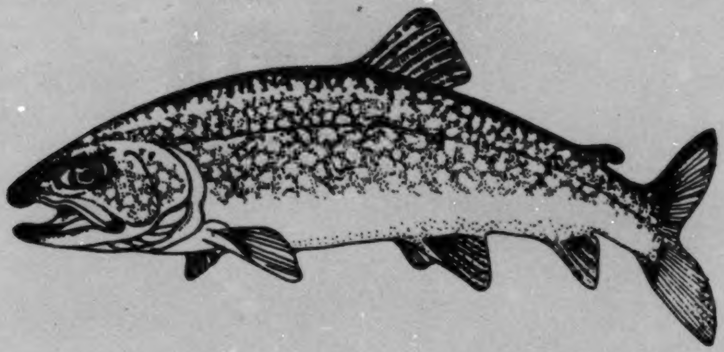
BURBOT

Lota lota
length: 15 inches
weight: 2-3 pounds
coloring: mottled olive-green to shades of brown on back; cream-colored underneath
common names: lawyer, American burbot, ling, eelpout, loche, freshwater cod



ALEWIFE

Alosa pseudoharengus
length: 6 inches
weight: 4 ounces
coloring: silvery with blue or blue-green metallic luster on back
common names: mulhaden, grey herring, golden shad, seth, skipjack



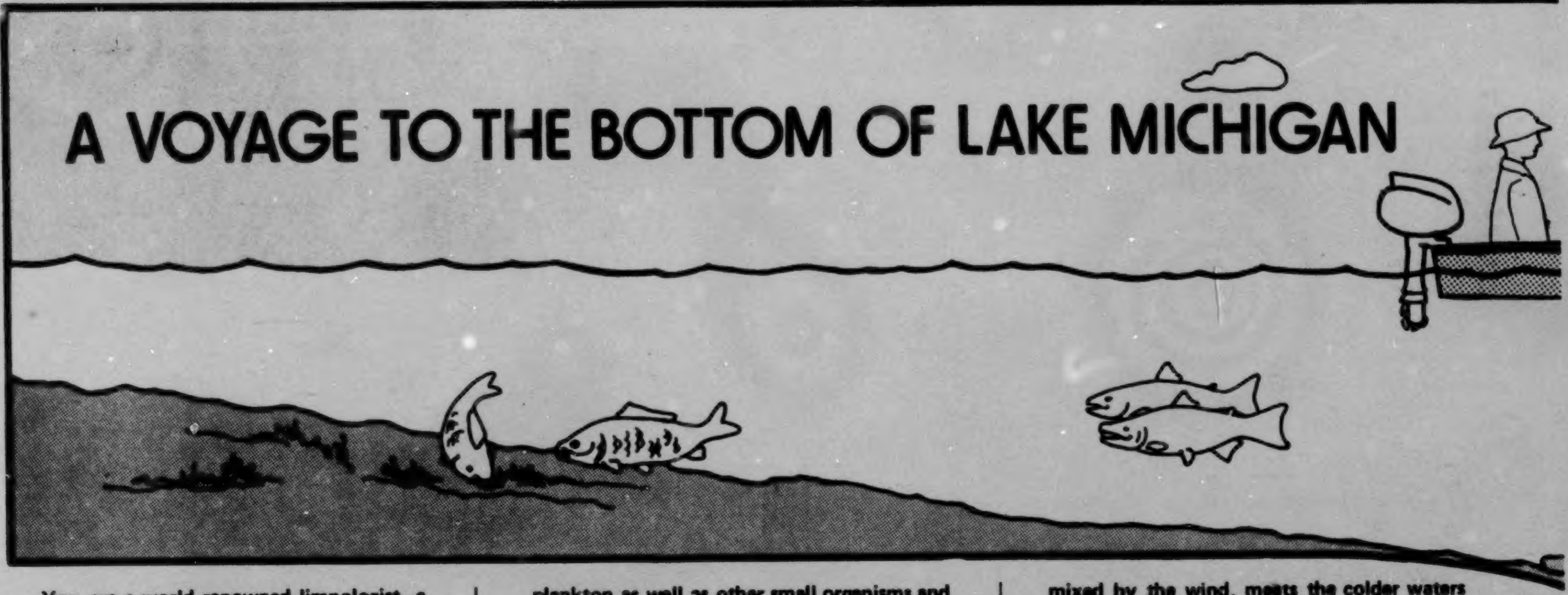
COHO SALMON

Oncorhyncus kisutch
length: 11-26 inches
weight: 5-12 pounds
coloring: steel-blue to slightly green on back; bright silver on sides; white underside
common names: coho, silver salmon, sea trout, blueback

Source:

"Fish of Lake Michigan," U.W. Sea Grant Institute, 1800 University Ave., Madison, Wisconsin, 53705, 1974.

A VOYAGE TO THE BOTTOM OF LAKE MICHIGAN



You are a world renowned limnologist—a scientist who studies lakes, ponds and rivers—and you've been chosen to make a descent to the bottom of Lake Michigan. Your mission: to observe life in the lake at different depths. You will descend in a research submarine, complete with observation window, oxygen supply and scientific gear.

The day of the descent arrives. After answering reporters' questions on this cool, September morning, you climb aboard the glass-bottom boat that will speed you to the submarine awaiting you a few miles offshore. As the boat pulls out of the Milwaukee harbor, you look through the glass bottom and see several carp lurking on the bottom. Imported by European immigrant farmers as a food fish in the late 1800's, these large scavengers are despised by many fishermen and duck hunters. Carp browse on submerged vegetation, uprooting plants which ducks need for food, destroying cover for native fish and muddying the waters.

plankton as well as other small organisms and insect larvae.

The whitefish has long been prized commercially for the quality of its meat. In 1836 one scientist wrote, "We can say from personal experience that a diet of whitefish alone, with no other food, can be eaten for days without losing its appeal." The fish still has appeal today. In 1976, over two million pounds of whitefish were harvested by Wisconsin fishermen using gill nets and pond nets. These went to restaurants and supermarkets throughout the country.

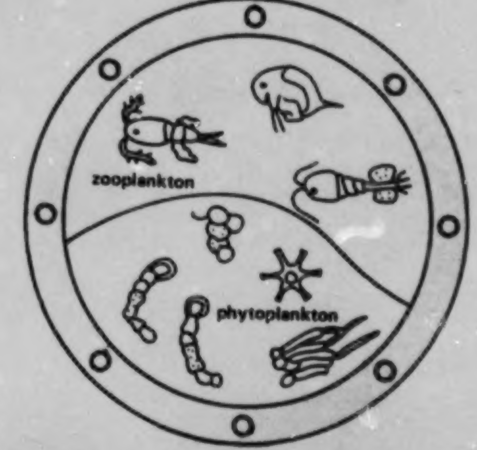
Near the shore you spot some large, reddish fish, not usually found so close to shore. These coho salmon are also coming in to spawn. Until recently, salmon did not exist at all in the lake. But in 1966, the state of Michigan began to stock the lake with Pacific salmon and now other states stock them in the lake as well. The salmon—coho, king and pink—were brought in to help keep problem fish under control and to provide excitement

mixed by the wind, meets the colder waters of the deep lake. The warmer water is not as heavy as the cold water and so lies like a blanket across the top of the lake in summer. As you drop below the thermocline, the temperature stabilizes at 4 degrees centigrade.

As winter approaches, this thermocline will disappear. The surface winds will cool the warm surface waters and help mix the two layers of water together until water at all depths is about the same temperature. This mixing also circulates nutrients from the lake bottom to the surface levels. These nutrients are critical to the growth of phytoplankton at the surface.

DEEP WATERS

In the dark, murky waters at 35 meters, arrow-like flashes scatter around the research vessel. You are passing through a school of rainbow smelt. This shimmering fish has a greenish back and a silvery belly. Like many



A more intensive commercial harvest of carp may reduce these problems. In foreign countries, carp are considered a great delicacy, and food scientists are working hard to develop a midwestern market for this much maligned fish, which has a firm, savory meat when raised in clean water.

Farther out, beyond the harbor entrance, you reach down from the boat to take a water sample. Under the microscope, you find the water teeming with tiny organisms—phytoplankton (microscopic plants) and zooplankton (microscopic animals). Phytoplankton are the basis for life in the Great Lakes, much as green plants are on land.

Phytoplankton convert the sun's energy into a source of food for other life forms, such as zooplankton. Small zooplankton, in turn, are eaten by larger zooplankton, insects and small fish—the food for larger fish. Thus the largest fish in the lake is ultimately dependent upon the tiny phytoplankton for its survival.

As the boat passes over some rocky reefs near shore, you notice several whitefish moving into shallow waters for their fall spawning. Although most adult whitefish average 20 inches in length and could easily swallow for sports fishermen.

In the fall, when the coho salmon are between one and two years old, they start the long journey back to spawn in the stream where they were stocked. Scientists believe salmon find their way back to their "home" streams by smell. Each stream, because of its unique vegetation and geology, is thought to have a distinct odor. The fish travels the lake edge until it finds the familiar smell of its home stream. Once upstream, the female salmon lays her eggs and the male salmon fertilizes them. Then, within a couple of weeks both parents die.

In Lake Michigan all their work is in vain; the eggs will never hatch. Salmon eggs can only develop in clear, gravel-bottomed stream beds, and Wisconsin and Michigan stream beds are far too muddy and silt-laden for hatching. So, young hatchery-reared salmon are placed in Lake Michigan streams every year to keep the cycle going.

MAKING YOUR DESCENT

You soon arrive at the research submarine and climb in. At long last you begin your descent. With a flurry of bubbles, you enter a silent world. As the submarine passes through the surface waters, you can see that the water is filled with tiny particles—some living creatures, some just bits of debris. At first the light coming through the portholes is a yellowish green. But as you approach 20 meters in depth, it grows darker and everything looks blue. As the light passes through the water, certain wavelengths of the sunlight are filtered out so that after a certain depth only the color blue is visible.

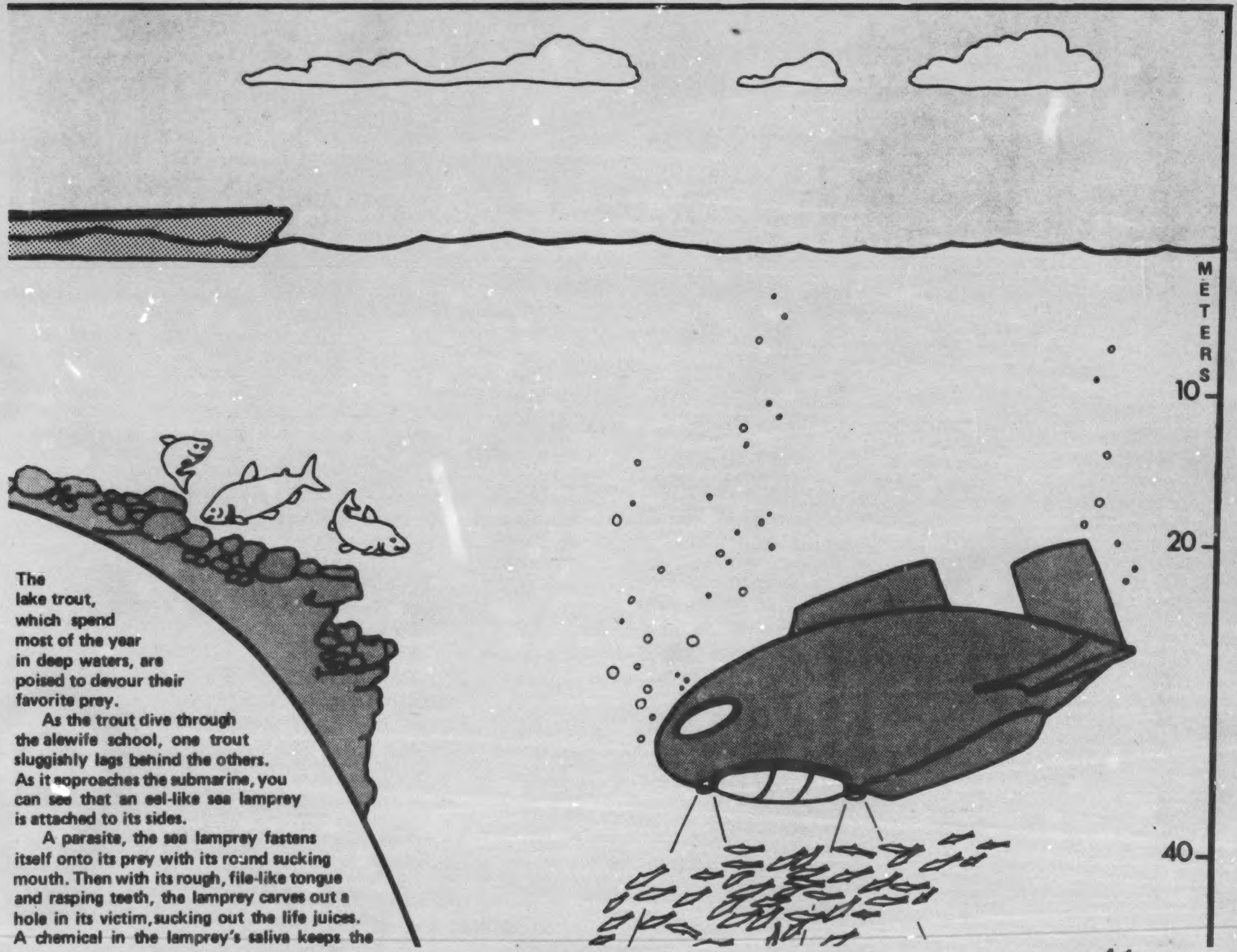
You turn on the vessel's searchlights. Through the porthole, a glance at the outside thermometer tells you a change is occurring. The temperature of the water, which had been 15 degrees centigrade (about 60 degrees Fahrenheit) near the surface, is suddenly dropping rapidly. You're approaching the thermocline—the invisible boundary where the upper water, warmed by the sun and other animals, the smelt is camouflaged by its coloring and thus protected from its prey. From above, the smelt's greenish back blends in with the dark waters below so that a predator looking down on the smelt won't be as likely to see it. From below, the smelt's silvery belly blends in with the bright sunlight, so a fish looking up at the smelt will have difficulty seeing it.

Like the salmon and carp, the smelt is a newcomer to the Great Lakes. Originally an ocean fish, it was introduced into a small lake connected to Lake Michigan in 1912. At first smelt were considered a nuisance, as hordes of them became entangled in fishermen's nets. But then fishermen began harvesting them and today the smelt is a popular sport fish and a tasty entree on restaurant menus.

Each spring the smelt swim into shore to spawn. Because they are sensitive to light and warm temperatures, they spawn mostly at night when it's cool and dark. On May evenings, sport fishermen line the Lake Michigan shores, throwing out small nets to catch the smelt. Often the fishermen enjoy the fruits of their nocturnal labors right then and there, breading and frying smelt as they are plucked from the net.

Going five meters deeper, you encounter the bloater chub—a fish becoming rarer in the lake. This small, soft-fleshed fish is the only deepwater "chub" in Lake Michigan where once many varieties lived. A relative of the whitefish, chubs have been popular fishes to eat since the early 1800's. But other larger chub species that once inhabited the lake have already succumbed to the combined pressures of over-fishing, sea lamprey attack and competition from the alewife.

Your submarine is approaching the 80 meter mark. You notice a passing school of alewives suddenly scatter in all directions. They are closely followed by several massive, hungry lake trout. The alewives—the most abundant fish in Lake Michigan—are now in deep water, having completed their summer spawning. Here they feed on zooplankton, fish eggs and small crustaceans



The lake trout, which spend most of the year in deep waters, are poised to devour their favorite prey.

As the trout dive through the alewife school, one trout sluggishly lags behind the others. As it approaches the submarine, you can see that an eel-like sea lamprey is attached to its sides.

A parasite, the sea lamprey fastens itself onto its prey with its round sucking mouth. Then with its rough, file-like tongue and rasping teeth, the lamprey carves out a hole in its victim, sucking out the life juices. A chemical in the lamprey's saliva keeps the wound open for hours or weeks until the lamprey has had enough or its victim dies. In its one to two year span as a parasite, it may destroy 18 kilograms (40 pounds) of fish.

It is estimated that the lamprey destroyed five million pounds of fish each year in Lake Michigan during the 1950's when lamprey populations were the greatest. In fact, the lamprey killed the last native trout in Lake Michigan. The trout now in the lake are hatchery-reared and, for the most part, have failed to reproduce in Lake Michigan. Chemicals are now used in spawning streams to kill lamprey larvae and reduce its population.

HITTING BOTTOM

At nearly 100 meters, a large shadowy structure suddenly becomes visible in the dark waters. You turn your searchlight in that direction to discover the unmistakable skeleton of an old shipwreck!

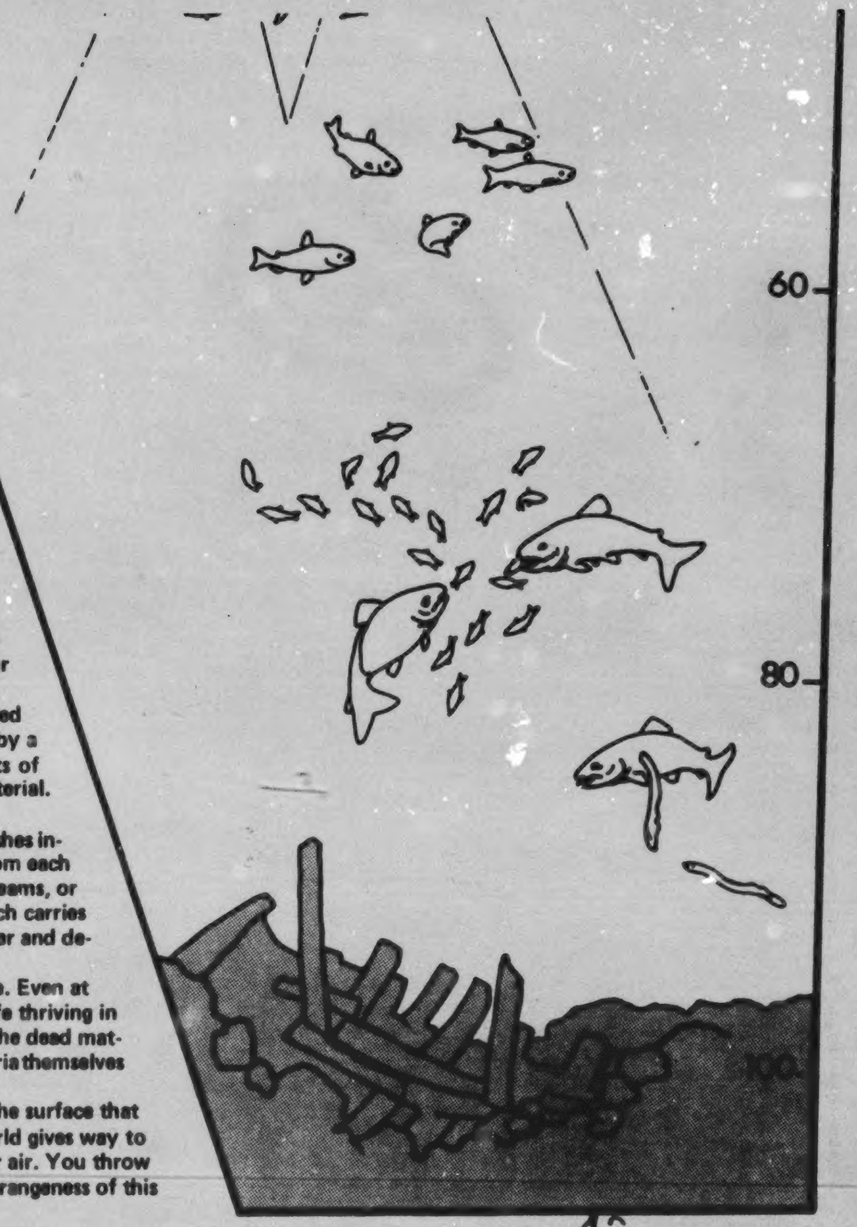
The bottoms of the Great Lakes are littered with thousands of these shipwrecks. Most occurred during the early lumber boom from 1880-1901 when ships were not yet protected by steel hulls or guided by modern navigational aids. The wooden timbers of these wrecks are well-preserved, since the cold waters of the lake bottom discourage decay. In fact, it's so cold (4-5 degrees centigrade) that if you left your submarine without a wet suit, you would die in a matter of minutes.

Your submarine hits bottom with a gentle thud, as if you had landed on a giant pillow. Your searchlight reveals that the bottom is covered by a silky-textured mud. Floating above this grey-black ooze are pockets of wispy brown material—the remnants of dead algae and other plant material. Below the ooze lie glacial sediments almost 30 feet thick.

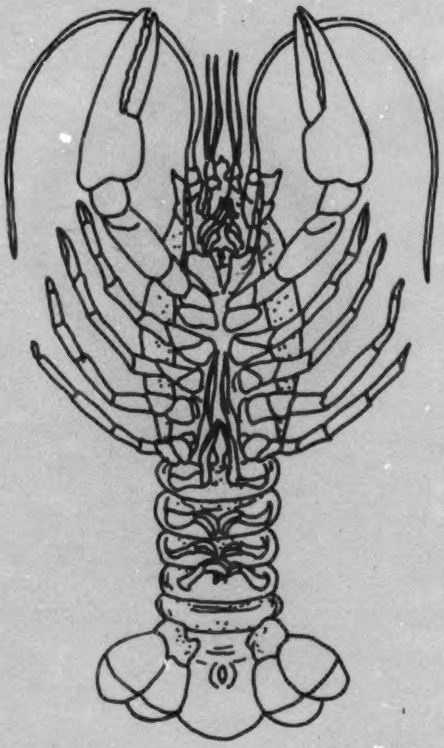
The lake bottom acts as a catch basin, collecting everything that washes into it from the land, as well as organisms that die and sink to the bottom each year. Rock materials also find their way into the lake, carried by streams, or eroded from shorelines. These materials are sorted by wave action which carries the finer particles of silt and clay and organic matter out into deep water and deposits the coarser sediments near shore.

You collect a sample of this mud and place it under the microscope. Even at these great depths, with no sunlight and little oxygen, you discover life thriving in the mud. Various forms of bacteria, fungi and worms work to convert the dead matter into small particles digestible by bottom-feeding crustaceans. Bacteria themselves also become food for other lake organisms.

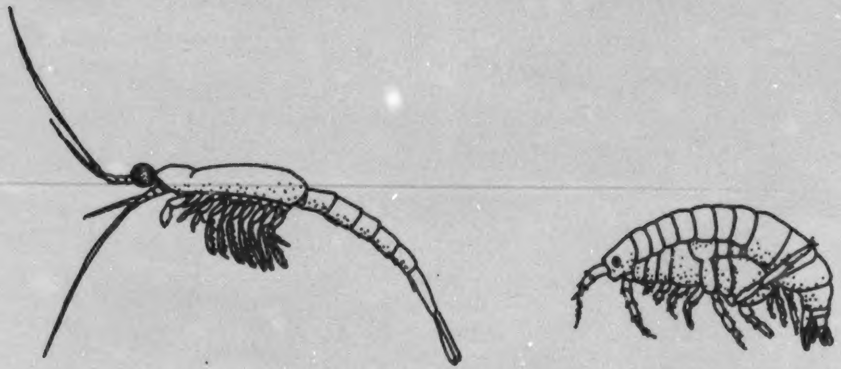
Now it's time to end your watery voyage; word has come from the surface that rough weather is approaching. As you begin your ascent, the dark world gives way to light. The submarine breaks out of the water into the cool September air. You throw open the hatch and squint in the sunlight, puzzling over the sudden strangeness of this dry, airy environment.



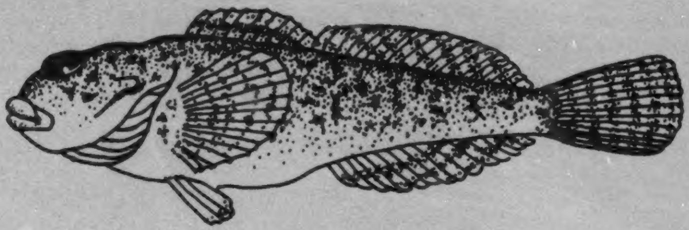
Source:
"Earthbeats: Great Lakes," Institute for Environmental Studies, UW Madison and the UW Sea Grant Institute, p. 6-7, 1978. Used by permission.



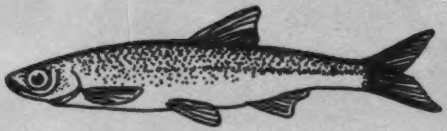
CRAYFISH
Average length: 3 in. or 7.5 cm.



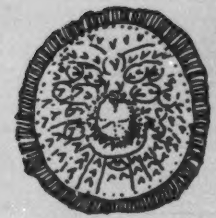
FRESHWATER SHRIMP
Average length: 2.3 in. or 6 cm.



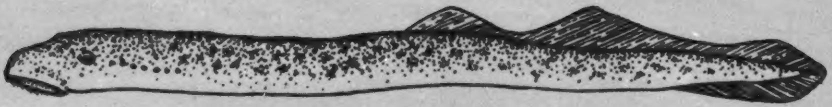
SCULPIN
Average length: 3.9 in. or 10 cm.



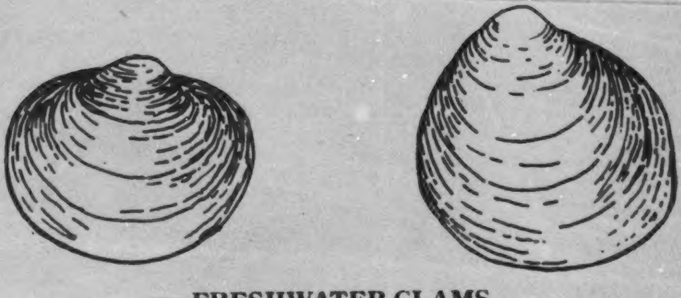
MINNOW
Average length: 3.9 in. or 10 cm.



LAMPREY MOUTH



LAMPREY
Average length: 2 ft. or .8 meters



FRESHWATER CLAMS
Average width: 2 in. or 5 cm.

Activity 5: Create A Critter

Life in a lake becomes more real to students when they make puppets and show how they live in a lake.

Grades: K-3
Subject Areas: Art, Language Arts, Drama, Science

Every creature must solve the problems of eating, breathing, moving around, procreating and surviving the threat of other creatures. Through the medium of puppets or creative dramatics your students can solve those problems for imaginary underwater creatures. Through discussion and manipulation of the creatures they can better understand how real lake creatures survive.

Procedure

6

1. Create a large bulletin board with a variety of underwater habitats as a resource for your children's imaginations. Perhaps you or your students could copy and color the creatures found in Activity 4 and place them on the bulletin board. The resource information in Activity 4, "Voyage to the Bottom of the Lake," might also be helpful in creating your bulletin board. Depending on the ages and skills of your students they may want to help too.

If you have created an underwater classroom as suggested in Activity 4, "Voyage to The Bottom of the Lake," discuss the various locations where underwater creatures live.

2. Collect and provide materials for making puppets. Some sample puppets using these materials may help your students get started. For puppet-making suggestions see books in the Resources section. Make your puppets good at one of the survival skills described in procedure 3 rather than realistic representatives of aquatic creatures. Some of the following items might spark your students' imaginations:

items in the underwater shades of brown and green
egg cartons
paper sacks
paper plates and cups
cardboard tubes of all sizes
boxes - shoe, match, tissue, salt, cereal
plastic jugs - bleach, detergent, bubble bath (rinsed out)
plastic eggs
plastic parts and pieces
cold cut packages
styrofoam balls and pieces
old gloves and mittens
old socks and tights
pantyhose (make great skin)
fabric and fake fur pieces
yarns, ribbons, laces
buttons and old jewelry
artificial flowers
plastic garbage bags

3. With older students, discuss the kinds of things every creature must do or be in order to survive. For younger students you may wish to describe these survival characteristics and place them on the blackboard for reference. These functions include:

Breathing
Eating
Moving around
Mating, laying eggs or birthing young
Avoiding being eaten by other creatures

Ask students to create a puppet which is especially good at one of the basic functions in this list and which lives in one of the underwater habitats on your bulletin board display. If the student selects eating, have him or her create a sample of the food as well.

4. When puppets are completed, ask students to demonstrate their puppet's special skill and talk about where it lives. You may want to have each student demonstrate without explaining and let the rest of the class guess what it's special skill is. Discuss the puppet's adaptations and ask students how it could be changed or improved to, for example, swim faster, eat more, eat more quickly, avoid being eaten in another habitat, etc.

5. Ask students to review pictures of real lake dwellers like those included in Activity 4 and describe how those creatures perform their basic functions. Do any real creatures, or portions of real creatures, resemble the students' puppets?

6. Do a creative dramatics activity in which groups of 3-5 students become an imaginary creature which excels at one of the basic functions.

Taking It Further

Put fish and other lake dwellers into their natural context by visiting a nearby pond, river, stream or lake. You will need nets to help you and the students see the fish. Contact the fish manager with your state natural resources or conservation department or a nearby nature center for help. They may be willing to help with your field trip or could provide information on fish netting, fish farms, fish hatcheries, aquariums, etc.

Resources:

Books

Engler, Larry and Carol Fijan, *Making Puppets Come Alive*, Taplinger Publishing Company, Inc., New York, 1973.

Hanford, Robert Ten Eyck, *The Complete Book of Puppets and Puppeteering*, Sterling Publishing Co., Inc., New York, 1976.

Renfro, Nancy, *Puppets for Play Production*, Funk and Wagnalls, N.Y., 1969. (This older book on puppetmaking is highly recommended by Madison's "puppet lady," Betty Frater.)

Scholastic Book Services, *The Funcraft Book of Puppets*, Ottenheimer Publishers, Inc. Baltimore, 1976.

Activity 6: Here's Looking At Your Place: Community Profile Exchange

Students explore their own community and create a community profile that they exchange with students of Great Lakes communities.

Grades: 3-8
Subject Areas: Geography, Language Arts

Our home town geography is familiar to us. The geography of places we've never seen can seem sterile and boring. This activity will bring personality and life to a study of the Great Lakes coast. It will also help students appreciate their own environments as they develop a community profile.

Community profiles help governmental officials plan for economic development, municipal services (like sewer, water and roads), social services (like recreation facilities, clinics or hospitals, community centers, financial assistance budgets) and nearly every element of community supported programs. Businesses may review such profiles when considering whether to locate in a particular community.

Profiles usually include some or all of the following elements:

1. History
2. Physical geography and land uses
3. Environmental characteristics including climate and weather
4. Economics - sources of jobs and income
5. Demographics - the ages, incomes, ethnic backgrounds, training, etc. of the people who live there.
6. Sociological characteristics - the behaviors and values of the people who live in the community
7. Any major problems or issues facing the community (like school integration, pollution, entry or departure of a major employer, poverty, etc.)
8. Any special assets which enhance the community (highly educated population, attractive physical/environmental features, quality schools and government, major new developments like downtown revitalization, new harbor and boat docking facilities, ports, airports and rail depots.)

People don't always agree about elements included in profiles.

Procedure

1. Explain the idea of a community profile exchange to your students. Talk about how it will help them get to know their own community and compare it to one on the Great Lakes shore. Help your students choose and discuss locations on the lake shores they would like to learn about, then select a couple communities. You may want to exchange with more than one and you should have one in reserve in case you can't locate a cooperating teacher in your first choice community.

2. Contact a teacher who teaches a grade level close to yours in the chosen community(ies). You can do this by calling the public school office in that town. (Use long distance telephone information or check your library for telephone book from the community you're interested in.) The social studies, science or general curriculum coordinator for the school system may know an enthusiastic teacher who would enjoy the exchange opportunity. Get the name and address of the teacher and phone number if you want to call directly. Secure the teacher's agreement before continuing with the project. Discuss procedures such as: developing question lists independently then exchanging them for agreement on final list, general timetable, availability of special equipment like video cameras and playback equipment, plans for student letter exchange, etc.

3. Help your students develop questions for the exchange class. Your students will answer the same questions for the profile on their own community.

Make sure questions focus on how people use the lakes in the Great Lakes shore community. (If you are in an inland community you will want to identify a similarly important geographic feature near you, e.g. high quality farmland, forests, river, hill or mountain, etc. It may be more of a challenge for city schools to identify the important geographic feature(s) which attracted so many people to the area.) Some of the following might be included in your list:

How did the town get started?
What does it look like?
Who lives there?

Why do they live there?
How do they earn a living?
What do they do for recreation?
What is the weather and climate like?
What do the native trees, grasses, flowers and crops look like?
How big is the town?
How do people use the Great Lake where the town is located?
Do they have any environmental problems? What are they?
What's the biggest asset the town has?
What's its biggest problem?
What makes the community unique?

4. Include the questions in your letter to the exchange teacher. A sample letter is included here. Your students may want to help with the letter. Be sure to enclose a copy of this lesson plan for the teacher.

5. Have each student in the class write a letter to the exchange class describing a favorite outdoor place and why it is special, mother's and father's jobs, and one or two things about him/herself (favorite sport or activity, interesting experience, future plans, etc.) Enclose student letters with your letter to the teacher.

6. After the two classes have agreed on the questions to answer, develop a profile notebook about your community. Student volunteers can take photographs of the community and surrounding landscape. Make sure that each question you have developed is matched to at least one photo. You can collect the film and have it developed, then work with students to select the best photos for the notebook. (In a lower elementary class have your students plan a neighborhood or community journey. You might have to be the photographer.) Don't forget to include photos of the class, school and teacher. Students may also choose to bring copies of photos from home which show community scenes. Students not involved in the picture-taking can write captions describing each photo. Glue the photo to a sheet of paper and copy the description below it. Compile the photos in a binder.

Other materials that students have collected may also be included:

- A tourism brochure of community attractions (from Chamber of Commerce).
- A map. Mark locations of photos on it if appropriate.
- An article from the local paper describing a recent school or community event, especially if it relates to the natural environment.
- Rocks or leaves gathered from the local area and labeled. Look for things that are unique or characteristic: sandstone if that is the predominant kind of rock; a dried alfalfa plant or corn leaf if you are in a farming community.

You might want to keep a copy of your notebook for yourselves. Make a bulletin board display of your community profile, leaving it half empty to build up excitement and expectation for the materials coming from your exchange class. If you are exchanging with more than one Great Lakes community, describe your letter exchange with other coastal communities in your cover letter. Those Great Lakes communities may also want to contact each other.

7. When the exchange materials come, review them with the class and have your students arrange them on your bulletin board. Discuss the various parts of the community as the exchange class describes them. Check to see how each question was answered.

8. Discuss the activity with your students:

- What have you learned about the Great Lakes (or some other item) that you didn't know before?
- What questions do you have about the Great Lakes (exchange community or other topic) that are still unanswered?
- What have you learned about our community that you didn't know before?
- What questions do you still have about our community?
- How does our community affect our behavior and life-style?
- How is the exchange community similar to our community? Different?
- What evidence is there of the influence of the lake on the exchange community?
- What effects have physical features like hills, water, forests, etc. had on shaping the exchange community? Our community?
- What important economic activities go on in the exchange community? Our community?
- What forms of transportation do people use? What other places do transportation routes link the exchange community to?
- What do you like best about the exchange community? Our community?

9. Summarize your discussion and include it with thank you notes to the exchange class. (You may want to have students answer one of the questions in #8 on their own individual thank you notes.) Take a photograph of your bulletin board display to send along.

Taking It Further:

1. If your community or county has a planning department, invite a planner to come to your class and tell how she/he develops profiles. Display your own profile efforts. Ask how profiles have been used in your area.

Sample Letter To Exchange Class

Address
City, State (Province)
Postal Code
Area Code and Phone #
Date

Mr./Ms (*teacher's name*)
School's Name
Address
Community, State, (or Province, CANADA), zip (or postal code)

Dear Mr./Ms. ____________________ and Class:

We are studying the Great Lakes region and are eager to know about your community and the nearby shore. After talking to you on the phone, I know you would also enjoy knowing about our community. We will send you a notebook describing our community in exchange for similar information about yours. The enclosed activity sheet describes our procedure. We hope to have our community and natural environment profile ready to send you by (date).

To help us both in developing our community and natural environment profiles, here are some specific questions we would like you to answer:

1. ____
2. ____
3. ____

etc.

Our class developed these questions. We will answer the same ones and more to describe our community. Please include any others your students may want to add.

We look forward to hearing from you soon. To get us started we have each written a letter describing ourselves and something about our community. They are enclosed.

Sincerely,

Mr./Ms. ______________
xth Grade Class
City Elementary School

Enclosure:
Activity description and
Student Letters

Activity 7: Great Songs Of The Great Lakes

Folk songs introduce students to life on the Great Lakes.

Grades: 3-8
Subject Areas: History, Music

Music creates a mood, tells a story, communicates feelings, makes work go faster and passes the time. Wherever people lived and relaxed in groups they often created songs about their experience. People working together used songs to pace their movements. By hearing and singing the tunes of other eras we can share in earlier people's lives for a moment. Great Lakes sailors, loggers and miners all enjoyed their own songs. Some of these historical songs are still very familiar to us today, like "Alouette," the voyageur's paddling song, and the "Erie Canal."

While the voyageurs were paddling through the lakes, their Ojibway Indian counterparts may have been camped on the shore singing traditional songs. This activity includes two simple Indian songs for comparison to Great Lakes ballads.

Many of the songs from Great Lakes sailors record shipwrecks and other disasters (like *The Julie Plante* and *The Phoenix*). Some record difficult passages (like *The Bigler's Crew*) or exciting trips (*Red Iron Ore*). Much can be learned about sailing life from singing the songs and thinking about the verses.

The sailors' impulse to sing about disasters, to share the facts and the feelings, is still very much with us. The sinking of the *Edmund Fitzgerald* in Lake Superior in 1975 led pop singer Gordon Lightfoot to write and record a song that became a million seller. You might want to borrow a recording of "The Wreck of the *Edmund Fitzgerald*" from your local library and play it for your class.

Procedure

1. With the help of a music teacher, a parent or community person with musical skills, lead students in singing the attached songs about life on the Great Lakes.

2. Discuss the kind of lifestyle or situation that is portrayed in the ballads about the lakes. The lyrics can be critiqued in the same manner as a story or poem. Have your students identify the plot, setting and conflicts. The following questions may help spark discussion:

- What role does nature play in these songs?
- What are the images of the lakes?
- What image of night is used in "The Julie Plante"?
- Why did the sailors in "Red Iron Ore" look like "red devils"?
- Compare the endings of "The Bigler's Crew" and "The Julie Plante." What attitude toward life as a Great Lakes sailor does each take? Are they different? How?
- What is the effect on the listener when the last line of the first verse of "The Steamship Phoenix" is repeated in the last verse?
- How do you think it felt to be a sailor in the song "Red Iron Ore"? "The Steamship Phoenix"?
- How does the music help convey the story in "Red Iron Ore"?
- Notice the repeated lines: "derry down, down, down, derry down" in Red Iron Ore, and "watch her, catch her, jump up on her juber ju" in "The Bigler's Crew." What does the repetition of these nonsense phrases do for the song?

3. After the children have sung "Lullaby" and "Song of the Dancing" once or twice, talk about the differences between Indian songs and the Great Lakes ballads. Help them notice the use of "vocables" - syllables or sounds with no meanings which often represent sounds of nature. Compare these repeated sounds with those in "Bigler's Crew" and "Red Iron Ore." How are they different? How are they similar? How are the sounds of the music different? Similar?

4. After discussion ask students if they want to sing the songs again. They might express more feeling for the topics presented in the songs.

Taking It Further

1. Students can use the songs as inspiration for creative writing of poems, stories and news articles, or they may illustrate the songs as an art project.

2. Using a real or imaginary Great Lakes event, students could write words to a new song and set it to one of these tunes or some other familiar tune.

3. Recordings of local folk songs are available in many regions. They frequently have limited distribution. Check with your local library, museum or historical society. Record collections at major radio stations, particularly public or educational stations, may also hold such recordings. Regional folk song collecting occurred widely in the 1930's and 1940's. Many of these songs are published and available through State Historical Society collections. One new record which is expected to have wider distribution is "From Fresh Waters" by Canadian folk singer Stan Rogers.

Resources:

Books

Lomax, Alan, *The Folk Songs of North America,* Doubleday and Co., Garden City, N.Y., 1960.

Nute, Grace Lee, *The Voyageur,* D. Appleton & Co., New York, 1931. Reprinted 1955 by The Minnesota Historical Society, St. Paul. Includes several songs of the voyageurs.

Peters, Harry B., Ed., *Folk Songs Out of Wisconsin,* The State Historical Society of Wisconsin, Madison, WI, 1977.

Periodicals

Peterson, David, "Wisconsin Folk Songs," *Badger History, Wisconsin Folklore,* vol. xxvii, no. 2, Ed. Howard Kanetzke, Wisconsin State Historicl Society, Madison, WI, November, 1973.

Records

Rogers, Stan, "From Fresh Waters," Fogarty's Cove Music, Inc. Available in record stores or write: Valerie Rogers, Woodburn Rd., RR#1, Hannon, Ontario, Canada, LOR 1PO

Folkways, "Songs of the Great Lakes," available as Catalogue #4018 from Elderly Instruments, 1100 N. Washington, Lansing, Michigan 48906. Call (517) 372- 7880. Price (1984) $7.95 plus postage.

People

Brauer, Charles, Box 220C, Ferryville, WI 54628. Brauer is a folksinger and composer who teaches in schools through "artist-in-the-schools" programs.

Curricula

"Ojibwe and Others," *People of Native Ancestry, Touch a Child* Series, Midnorthern Ontario Region Curriculum Development, Ontario Ministry of Education, Mowat Block, Queens Park, Toronto, Ontario, M74 1L2.

Red Iron Ore

A MINING ENGINEER, named George Sturz, who was a dreamer and a stubborn man, came into the low-lying hills west of Lake Superior with the conviction that he would discover valuable mineral deposits there. He and his Negro servant, Bonga, fought through the tamarack, endured the attack of hordes of mosquitoes during long summer months, until Sturz found the iron deposits he was looking for. In 1884 he watched the first schooner laden with almost pure iron ore put out from a Minnesota port bound for the iron foundries of the East. Other iron pits opened back of Duluth and, before Sturz died, he saw on the Lakes a fleet of vessels of larger tonnage than the combined Pacific and Atlantic maritime fleets of the U.S.A, carrying the iron for the sinews of the nation east along the Lakes.

This ballad, set to the ever-fresh Irish derry-down tune, stems from the days of sailing ships and shovel loading. Today the leading docks of Duluth can pour twelve thousand tons of iron into the hold of an ore-carrying steamer in a quarter of an hour. Then with her decks nearly awash, the great vessel surges out into the wicked chop of Lake Superior to race her sister ships for the ports along Lake Erie's shore.

Source:

Alan Lomax, *The Folk Songs of North America.* Doubleday and Co., Garden City, New York, 1960. pp. 122, 127. (Used by permission.)

The Julie Plante

THE DEEPWATER SAILORS from New England who shipped out on the Great Lakes expecting to find a soft berth and easy voyages received a rude surprise. The runs between ports were brief, but this only meant more work for the crews in loading and unloading the grain, the lumber, and the iron ore. Whipped by continental winds and tempests of polar origin, the lakes churned up tremendous seas, and in these narrow waters there was little room for a vessel to run before a storm . . . Someone has said that if the Lakes were drained, the bottom would be found covered with skeletons of hundreds of vessels and thousands of men lost there since navigation began in the early eighteenth century.

Apart from the sea chanteys, which were sung on the Lakes in the days of sail, shipwreck songs form the largest section of the folklore of the Great Windy Lakes. This ballad comes from the pen of W.H. Drummond (1865–1907), famous for his poetry in *habitat,* or French-Canadian English, but it appealed so much to the Lake sailors that, long before it was published, it was a favourite in barrooms all round the Lakes.

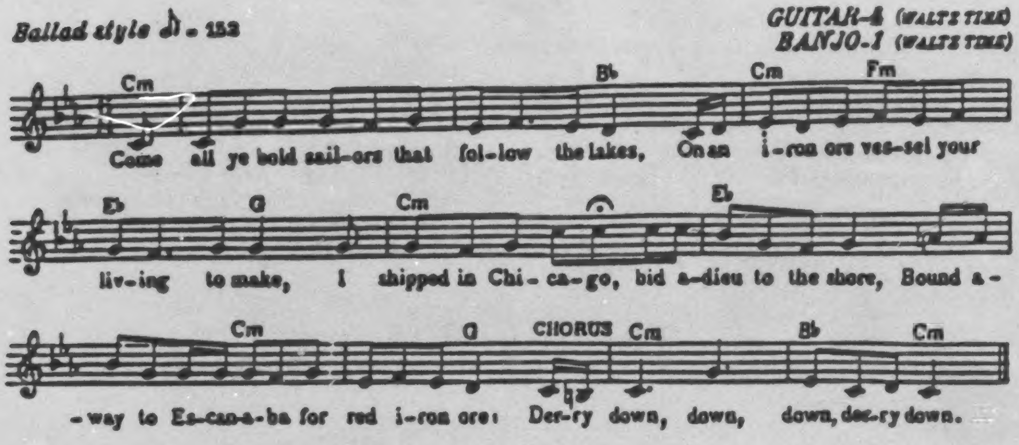
Source:

Alan Lomax, *The Folk Songs of North America,* Doubleday and Co., Garden City, New York, 1960, pp. 122, 128. (Used by permission.)

BEST COPY AVAILABL

Red Iron Ore

"Red Iron Ore," Reprinted by permission of the publishers from *Ballads and Songs of the Shanty Boy* by Franz Rickaby, Cambridge, Mass.: Harvard University Press, copyright 1926 by the president and fellows of Harvard College, copyright 1954 by Lillian Rickaby Dykstra, p. 164.


Ballad style ♪. = 152
GUITAR-4 (WALTZ TIME)
BANJO-1 (WALTZ TIME)
Cm
Bb
Cm
Fm
Come all ye bold sail-ors that fol-low the lakes, On an i-ron ore ves-sel your
Eb
G
Cm
Eb
liv-ing to make, I shipped in Chi-ca-go, bid a-dieu to the shore, Bound a-
Cm
G
CHORUS
Cm
Bb
Cm
-way to Es-can-a-ba for red i-ron ore: Der-ry down, down, down, der-ry down.

1 Come all ye bold sailors that follow the lakes,
On an iron ore vessel your living to make,
I shipped in Chicago, bid adieu to the shore,
Bound away to Escanaba for red iron ore:
CHORUS:
Derry down, down, down, derry down.

2 Next morning we hove up along the *Exile*,
And soon was made fast to an iron ore pile,
They lowered their chutes and like thunder did roar,
They spouted into us that red iron ore. (CHO.)

3 Some sailors took shovels, while others got spades,
And some took wheelbarrows—each man to his trade,
We looked like red devils, our fingers got sore,
We cursed Escanaba and that damned iron ore. (CHO.)

4 The tug *Escanaba* towed us out of the Minch,
The *Roberts*, she thought she'd left us in a pinch,
And as she passed by us, she bid us goodbye,
Saying, 'We'll meet you in Cleveland next 4th of July.' (CHO.)

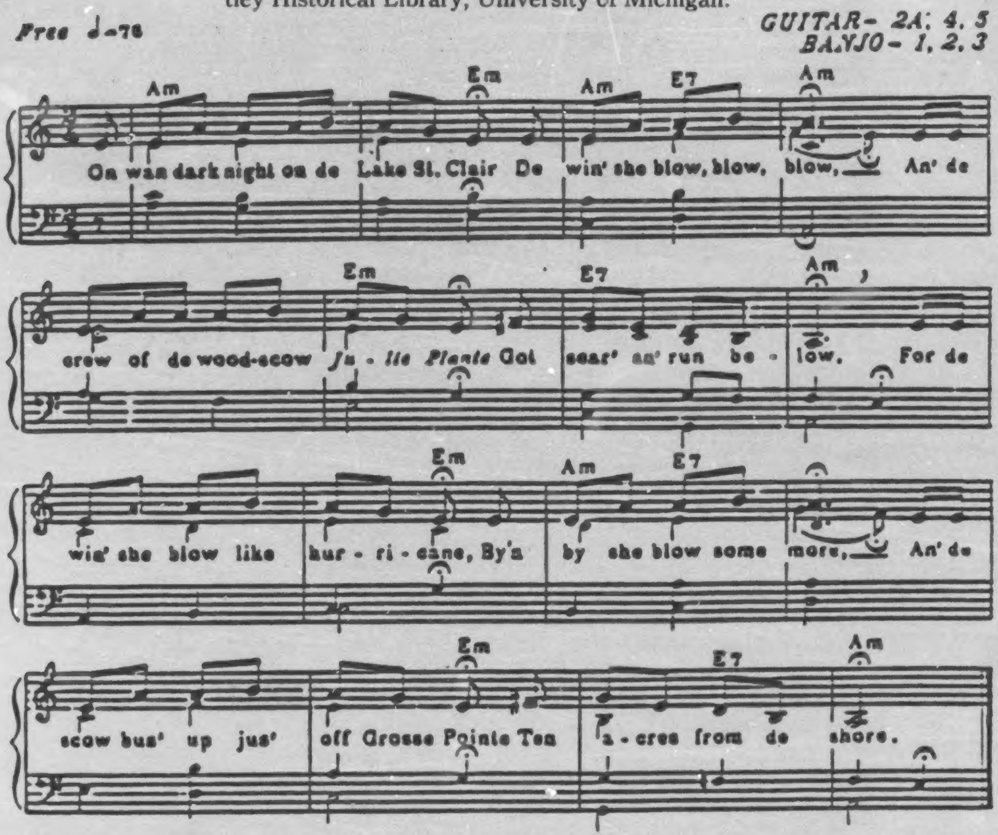
5 Through Old Louise Island it blew a fresh breeze,
We made the Foxes, the Beavers, the Skilligalees,
We flew by the Minch for to show her the way,
And she never hove in sight till we were off Thunder Bay. (CHO.)

6 Across Saginaw Bay the *Roberts* did ride,
With dark and deep water rolling over her side,
We went through North Passage—O Lord, how it blew,
And all round the Dummy the fleet followed, too. (CHO.)

7 Now the *Roberts*'s in Cleveland, made fast stem and stern,
And over the bottle we'll spin a big yarn,
But Captain Harvey Shannon had ought to stand treat,
For getting to Cleveland ahead of the fleet. (CHO.)

The Julie Plante

"The Julie Plante," from the Ivan Walton Collection, Box 5 Michigan Historical Collections, Bentley Historical Library, University of Michigan.


Free ♩=76
GUITAR- 2A; 4, 5
BANJO- 1, 2, 3
Am
Em
Am
E7
Am
On wan dark night on de Lake St. Clair De win' she blow, blow, blow, An' de
Em
E7
Am
crew of de wood-scow Ju - lie Plante Got scar' an' run be - low. For de
Em
Am
E7
win' she blow like hur - ri - cane, By'n by she blow some more, An' de
Em
E7
Am
scow bus' up jus' off Grosse Pointe Ten a - cres from de shore.

1 On wan dark night on de Lake St. Clair
De win' she blow, blow, blow,
An' de crew of de wood scow *Julie Plante*
Got scar' an' run below.
For de win' she blow like hurricane,
By'n by she blow some more,
An' de scow bus' up jus' off Grosse Pointe
Ten acres from de shore.

2 De captain walk on de fron' deck,
He walk on de hin' deck, too;
He call de crew from up de hol'
An' he call de cook also.
De cook she's name was Rosie,
She com' from Montreal
Was chamber-maid on lumber barge
On de beeg Lachine Canaul.

3 De night was dark like wan black cat,
De wave run high an' fas',
W'en de captain take hees poor Rosie
An' lash her to de mas'.
An' den he take de life preserve
An' jump off in de lake,
Say'n, 'Au revoir, ma Rosie dear,
I go drown for your sake.'

4 Nex' mornin' veree earlee,
'Bout half pas' two-t'ree-four,
De captain, scow, an' poor Rosie
Was corpses on de shore.
For de win' she blow like hurricane,
An' den she blow some more,
An' de scow bus' up jus' off Grosse Pointe,
Ten acres from de shore.

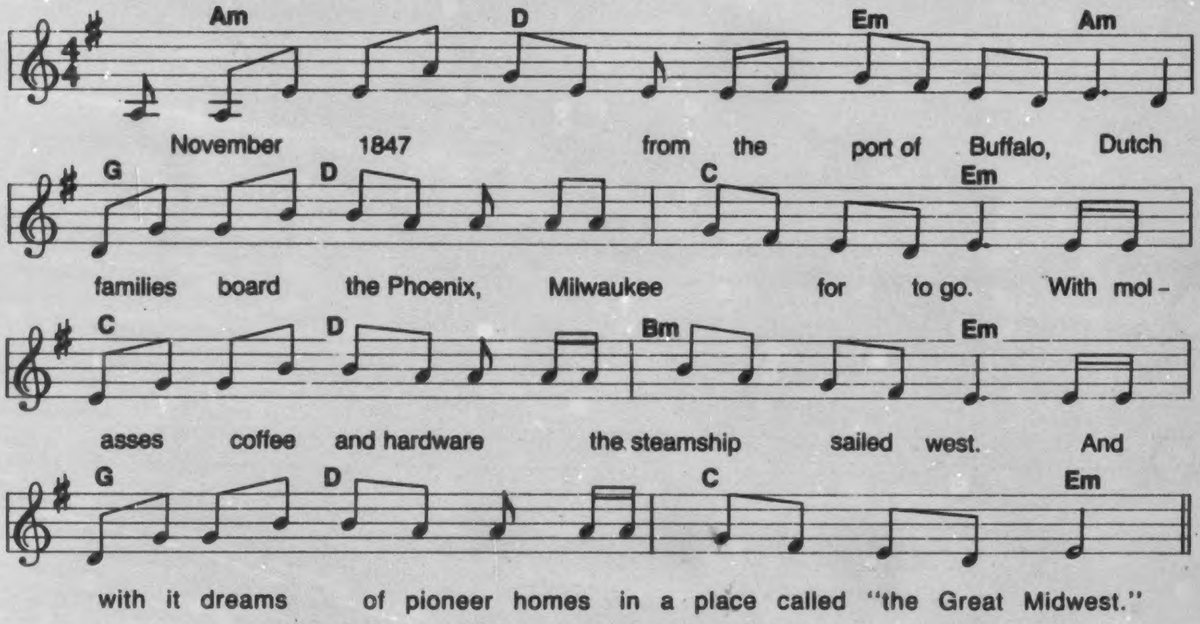
5 Now, all good wood scow sailormen,
Take warnin' by dat storm,
An' go marree some nice French girl,
An' leev on wan beeg farm.
De win' may blow like hurricane
An' s'pose she blow some more,
You can't get drown on Lake St. Clair
So long you stay on shore.

BEST COPY AVAILABLE

The Steamship Phoenix

Sea Chanty

Charles Brauer
October 18, 1973


Am
D
Em
Am
November 1847 from the port of Buffalo, Dutch
G
D
C
Em
families board the Phoenix, Milwaukee for to go. With mol-
C
D
Bm
Em
asses coffee and hardware the steamship sailed west. And
G
D
C
Em
with it dreams of pioneer homes in a place called "the Great Midwest."

2 Lake Erie and Lake Huron, through the Straits of Mackinaw
All went well untill just south of the harbor of Manitowoc.
In the early morning when all was still the cry of "FIRE!" rang out
And the passengers awoke to bucket brigades 'midst frightened screams & shouts.

3 Two small lifeboats were set afloat—43 people got in
To head for shore and get some help from the nearby light of Sheboygan.
But the ship burned fast and those on board threw doors & ladders out
To the icy waters where the people jumped—to cling to them no doubt.

4 For two whole hours they paddled and swam hoping for help to arrive.
But one by one they froze and drowned 'til none but three survived.
Though the list of names was not complete 'bout 250 were gone,
Nearly all of them from Holland had come four thousand miles from home.

5 November 1847 from the port of Buffalo,
Dutch families board the Phoenix, Milwaukee for to go.
But a fire on the waters of Lake Michigan put most of them to rest
And with them dreams of pioneer homes in a place called the "Great Midwest."

© Charles Brauer 1973

THE BIGLER'S CREW

Sung by M. C. Dean, Virginia, Minnesota, for Franz Rickaby.

Come all my boys and listen, a song I'll sing to you.
It's all about the *Bigler* and of her jolly crew.
In Milwaukee last October I chanced to get a sight
In the schooner called the *Bigler* belonging to Detroit.
Chorus: Watch her, catch her, jump up on her juber ju.
Give her the sheet and let her slide, the boys will push her through.
You ought to seen us howling, the winds were blowing free,
On our passage down to Buffalo from Milwaukee.

It was on a Sunday morning about the hour of ten,
The *Robert Emmet* towed us out into Lake Michigan;
We set sail where she left us in the middle of the fleet,
And the wind being from the southard, oh, we had to give her sheet.

Then the wind chopped round to the sou-sou'west and blew both fresh and strong
But softly through Lake Michigan the *Bigler* she rolled on,
And far beyond her foaming bow the dashing waves did fling,
With every inch of canvas set, her course was wing and wing.

But the wind it came ahead before we reached the Manitous.
Three dollars and a half a day just suited the *Bigler's* crew.
From there unto the Beavers we steered her full and by,
And we kept her to the wind, my boys, as close as she could lie.

Through Skillagalee and Wabble Shanks, the entrance to the Straits,
We might have passed the big fleet there if they'd hove to and wait;
But we drove them on before us, the nicest you ever saw,
Out into Lake Huron from the Straits of Mackinaw.

We made Presque Isle Light, and then we boomed away,
The wind it being fair, for the Isle of Thunder Bay.
But when the wind it shifted, we hauled her on her starboard tack
With a good lookout ahead for the Light of the Point Au Barques.

We made the light and kept in sight of Michigan North Shore,
A-booming for the river as we'd oftimes done before.
When right abreast Port Huron Light our small anchor we let go
And the *Sweepstakes* came alongside and took the *Bigler* in tow.

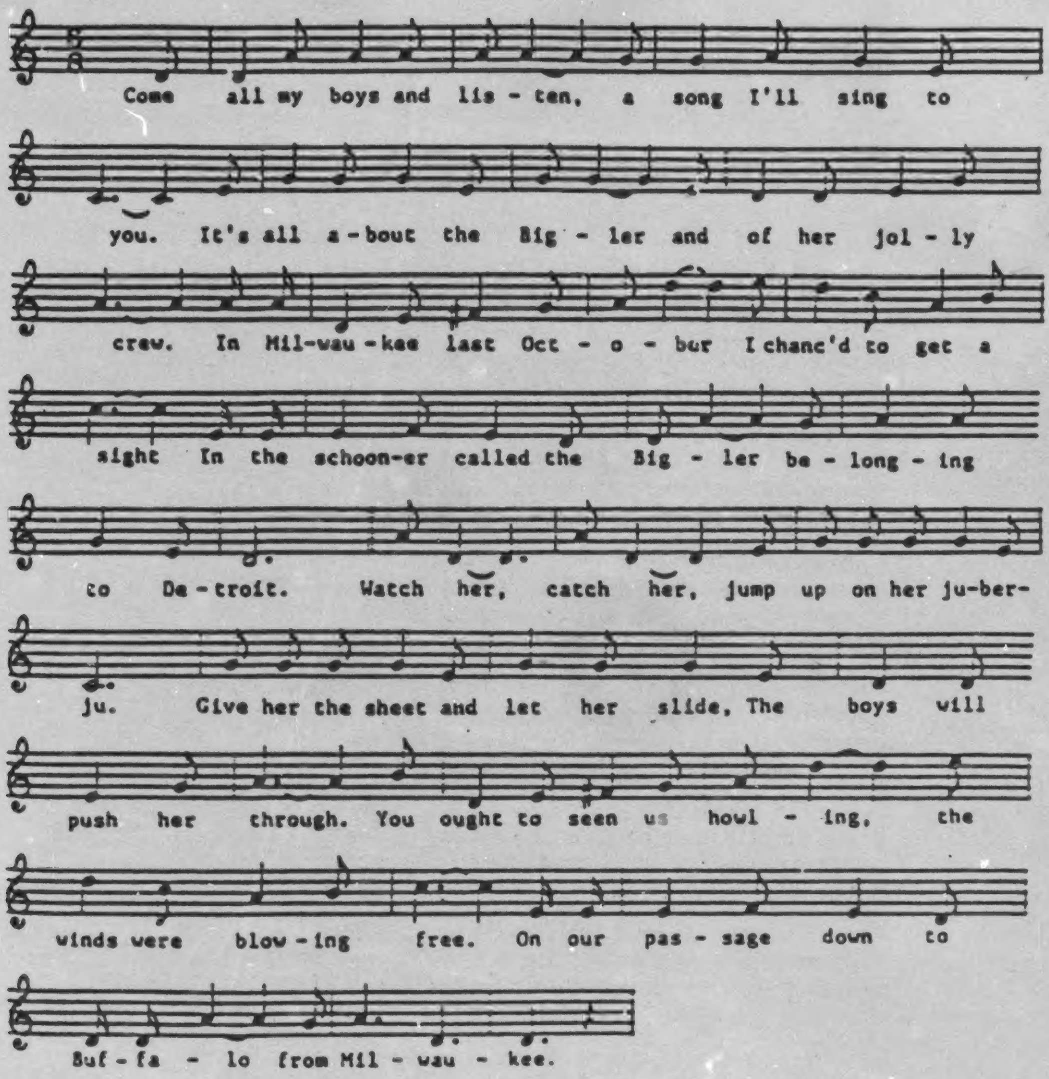
The *Sweepstakes* took eight in tow and all of us fore and aft,
She towed us down to Lake St. Clare and stuck us on the flats.
She parted the *Hunter's* tow-line in trying to give relief,
And stem and stern went the *Bigler* into the boat called *Maple Leaf.*

The *Sweepstakes* then she towed us outside the River Light,
Lake Erie for to roam and the blustering winds to fight.
The wind being from the southard we paddled our own canoe,
With her nose pointed for the Dummy she's hell-bent for Buffalo.

We made the Oh and passed Long Point, the wind was blowing free.
We howled along the Canada shore, Port Colborne on our lee.
What is it that looms up ahead, so well known as we draw near?
For like a blazing star shone the light on Buffalo Pier.

And now we are safely landed in Buffalo Creek at last,
And under Riggs' elevator the *Bigler* she's made fast.
And in some lager beer saloon we'll let the bottle pass,
For we are jolly shipmates and we'll drink a social glass.
Chorus: Watch her, catch her, jump up on her juber ju.
Give her the sheet and let her slide, the boys will push her through.
You ought to seen us howling, the winds were blowing free,
On our passage down to Buffalo from Milwaukee.

The Bigler's Crew


Come all my boys and lis - ten, a song I'll sing to
you. It's all a - bout the Big - ler and of her jol - ly
crew. In Mil-wau - kee last Oct - o - bur I chanc'd to get a
sight In the schoon-er called the Big - ler be - long - ing
to De - troit. Watch her, catch her, jump up on her ju-ber-
ju. Give her the sheet and let her slide, The boys will
push her through. You ought to seen us howl - ing, the
winds were blow - ing free. On our pas - sage down to
Buf - fa - lo from Mil - wau - kee.

Source:

Harry B. Peters, editor, *Folk Songs Out of Wisconsin:* an illustrated compendium of words and music (State Historical Society of Wisconsin, 1977). Used by permission.

BEST COPY AVAILABLE

Indian Songs*

The songs of the Indians have a rich vitality about them, voicing with passion an endless search for the magic of life. There is no one kind of Indian music; rather there are many kinds. All songs seem to have some common points: they were transmitted from generation to generation orally, the melodies are simple and repetitive with little in the way of harmony, and many of the words are "vocables" - sounds with no meanings but which are often representative of the sounds of nature, eg. birds calling, wind blowing, grass rustling. The songs are not language- centered.

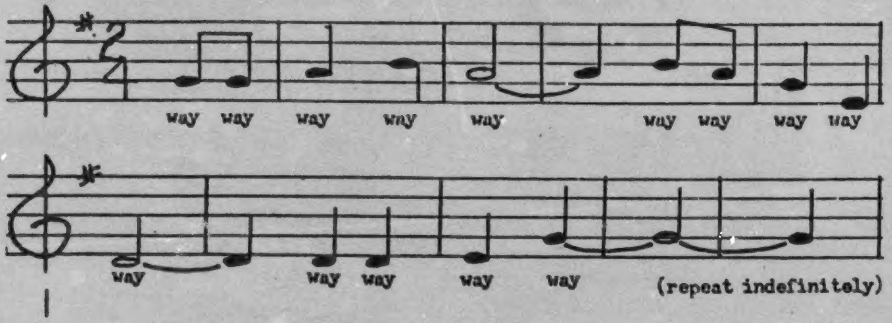
For some, the other world is hidden in the sky, or under the earth, or in the mountains, or beneath the sea. All of the tribes agree that there is another world to which one may fly in death, in trances, or in dreams. The voice was the invisible messenger that reached the invisible powers, and it was song that formed those messages. When the Indian went out to hunt he sang so that he might be successful and bring back food to his family; he sang so that he would be strong enough to meet his fate without flinching; he sang so that medicines would do their work better; he sang so seeds would bring forth bountiful crops.

Johnny Yesno, an Ojibwe entertainer says this about songs and music:

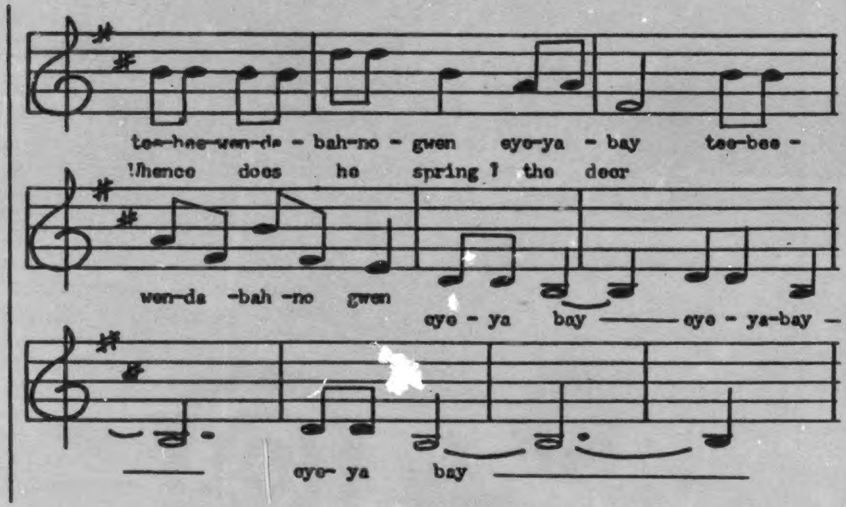
> The Indian people had music for practically everything that they ever did. I know that the Navaho people had a trail song; they would sing this away far off and they would have a couple of riders who sing at night time and they would sing a night chant. And there is a reason for that; they sing this song so that they would let the people know that they were coming and you would hear them approaching, and going by you and then departing. The song let people know that they were travelling.
> Source:

*"Ojibwe and Others," People of Native Ancestry, Touch a Child Series, Midnorthern Ontario Region Curriculum Development, Ontario Ministry of Education, Toronto, Canada.

LULLABY


way way way way way way way way way
way way way way way
(repeat indefinitely)

SONG OF THE DEER DANCING


tee-hee-wen-de - bah-no - gwen eyo-ya - bay tee-bee -
Whence does he spring ? the deer
wen-da -bah -no gwen
eye - ya bay —— eye - ya-bay —
——
eye- ya bay ——

Source:

*"Ojibwe and Others." *People of Native Ancestry, Touch a Child* Series. Midnorthern Ontario Region Curriculum Development, Ontario Ministry of Education, Toronto, Canada.

Activity 8: Ojibway-Early Immigrants To The Great Lakes Region

Most history books say Europeans "discovered" North America as if it had no history before then. As a result, students know little about the American Indians who settled here long before the Europeans came. This activity introduces students to one tribe of early Great Lakes settlers, the Ojibway (Chippewa), who began to migrate from what would later become New Brunswick and Maine in 900A.D. This activity will be most effective if paired with Activity 14 or a classroom unit on European immigration to the Midwest.

Grades: 3-6
Subject Areas: History, Language Arts, Art

The oral tradition of the Ojibway explains how their Anishinabe people came to the Midwest. While you tell this story, students can visualize the migration as they participate in the oral tradition. Through drawing and writing, students can compare the Ojibway and European migration to the Great Lakes.

The Ojibway people were one of several important Great Lakes area tribes. Their legends became better known than many other tribes because of the poet Longfellow who immortalized them in the epic poem "Hiawatha". (For some Ojibway legends see Activity 12 and the resources cited there.)

Although a few thousand Ojibway people still live in reserves in Canada and the United States, the majority of these people now live in cities like Minneapolis, Milwaukee and Chicago where jobs are more plentiful.

Like many other minority groups in the U.S. and Canada, many Indians are seeking to understand and honor their own special history, culture and values. The book *Mishomis*, from which the Ojibway migration story is reprinted, is one of many books and other materials being developed by tribal members.

Procedure

1. In preparation for this activity, review the basics of storytelling. Read and analyze the migration story. Do not attempt to memorize it, but make the story your own by understanding its main point, the characters and the structure. For younger children you will want to simplify the language, keeping enough of the unfamiliar Indian words to carry the flavor without confusing or distracting your listeners. Depending on your audience, you may wish to shorten the story by leaving out some elements, or expand in some places to create a scene and dialogue (as in the scene of the woman telling her husband the dream of the turtle). By doing these things you will be participating directly in the oral tradition of storytellers adapting and changing their stories to hold the interest of their listeners. Practice telling the story aloud to yourself or a friend. (You may want to review storytelling techniques in the Emerson book cited at the end of this activity.)

2. Explain that before literacy and before books were common, most history was preserved by people telling about it in story form. Ask your students if they know any stories about their school, families or town? How do they know them? Many cultures experienced migrations and immortalized them in stories. One example is Moses leading the Chosen People to the Promised Land. Can your students think of others?

3. Discuss the oral (storytelling) tradition. Storytellers were loved and respected because they helped people understand their own history and taught them important lessons as well as providing entertainment. The Pellowski book listed at the end of this activity may help you explain oral tradition. By listening to the migration story that you tell, the students will be able to see the world for a little while through the eyes of an Ojibway.

4. Set the scene for good storytelling by picking a time when students are most likely to be attentive, building anticipation for the story in advance, and seating them in a circle on the floor or outdoors. Tell them the story. (A map on the bulletin board or an overhead transparency may help your students follow the migration route.)

5. After telling the story discuss any part that particularly seemed to interest students . Ask them to imagine what those scenes looked like and discuss some of these visualizations.

6. When the storytelling is over and the students return to their seats, ask them to name similarities

and differences between the Anishinabe people during their migration to the Great Lakes and the Europeans' migration. Ask students to think about how each group traveled, what they ate, what they carried, why each group left its homeland, how they felt about the new land, etc. What roles did the Great Lakes play in the lives of the Ojibway? The European immigrants? What attitudes toward nature and the environment do the Ojibway show in the story? How do they compare to those of the Europeans?

7. Make copies of the enclosed map following the story and ask students to add the present-day locations listed. If you have time ask students to remember what part that location played in the story.

Taking It Further

1. Give students a choice of drawing (sculpting, painting, etc.) or writing about the images they had as you told the story of the migration. Use reference books found in your local library or cited below and consult an art teacher to identify elements of Ojibway art, showing students how the Ojibway pictured their own lives.

2. Ask students to draw or write about their daily activities as if they had been with the Ojibway migration. For example, students can depict their reactions to a hot, dry period when little food was available.

3. Assign students to take the role of a reporter covering this story. They are to prepare a news summary which includes: 1) What happened; 2) Who was involved; 3) Where it happened; 4) When it happened; 5) Why it happened; 6) What is important about it; 7) A list of important vocabulary words; and 8) A headline. Re-tell the story (or make this assignment before the first telling). The students will present their summary as if in a TV news program. Discuss the difference between reporting and storytelling, journalism and oral history.

4. Ask students about oral tradition today. Do we have one? Why or why not? Can you give examples of oral history that you know about? How have books, radio and television affected our oral tradition?

Source:

Edward Benton-Banai. *The Mishomis Book: Voice of the Ojibway*, Indian Country Press, St. Paul, Minnesota, 1979, p. 94-102.

Resources:

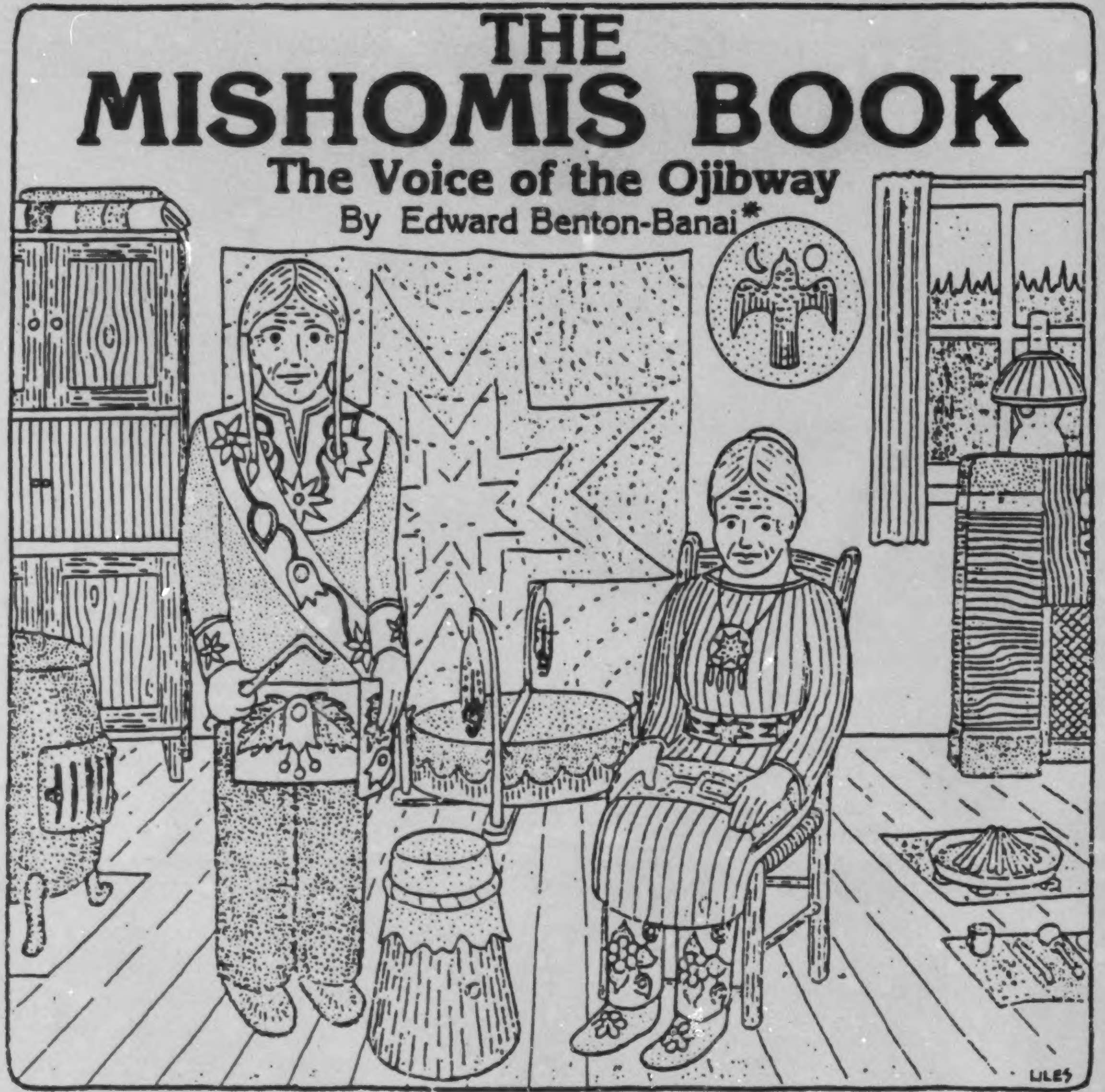
Books

Bierhorst, John, *Songs of the Chippewa*, Farrar, Straus andGiroux, Inc., New York, 1974.

Emerson, Laura S., *Storytelling: The Art and The Purpose*, Zondervan Publishing House, Grand Rapids, Michigan, 1959.

Lyford, Carrie A., *Ojibwa Crafts*, Bureau of Indian Affairs,U.S. Dept. of Interior, Washington, 1943.

Pellowski, Anne, *The World of Storytelling*, Bowker Publishing Co., N.Y., 1977.

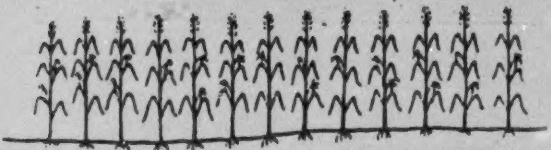

THE
MISHOMIS BOOK
The Voice of the Ojibway
By Edward Benton-Banai*
LILES

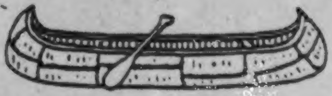
Chapter 14

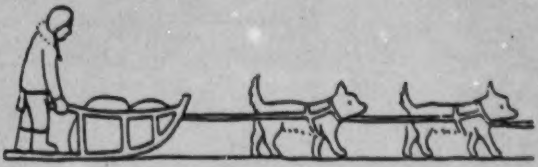
The Migration of the Anishinabe

Boozhoo, I am going to try to reconstruct the chi-bi-moo-day-win' (migration) of my Ojibway ancestors. I will draw upon the words given to us by the prophets of the Seven Fires. I have also looked at old maps of North America that might give hints to places referred to by the seven prophets and by my grandfathers. Finally, I have listened to what the scholars have had to say about early written accounts of this country.

When the seven prophets came to the Anishinabe, the nation was living somewhere on the shores of the Great Salt Water in the East. There are many opinions about where this settlement was. It is generally agreed that the Ojibways and other Algonquin Indians were settled up and down the eastern shores of North America. We have some idea of the size of the nation from these words that have been handed down: "The people were so many and powerful that if one was to climb the highest mountain and look in all directions, they would not be able to see the end of the nation." Bands and clans were scattered here and there. There were berry pickers, wood carvers, fishermen, canoe makers, and stone carvers. There were those who were charged with raising food from Mother Earth. They were called the Gi-ti-gay'-wi-nini-wug' (planters or keepers of the Creator's garden). There was an active exchange and communication among all the groups of people. They used the waterways of the land to travel by canoe. They had a system of overland trails. They used sleds and dog teams to travel in the winter. Life was full for the people here. The Clan System and its government were strongly enforced. There was ample food from the land and sea, and there were fish from many rivers.

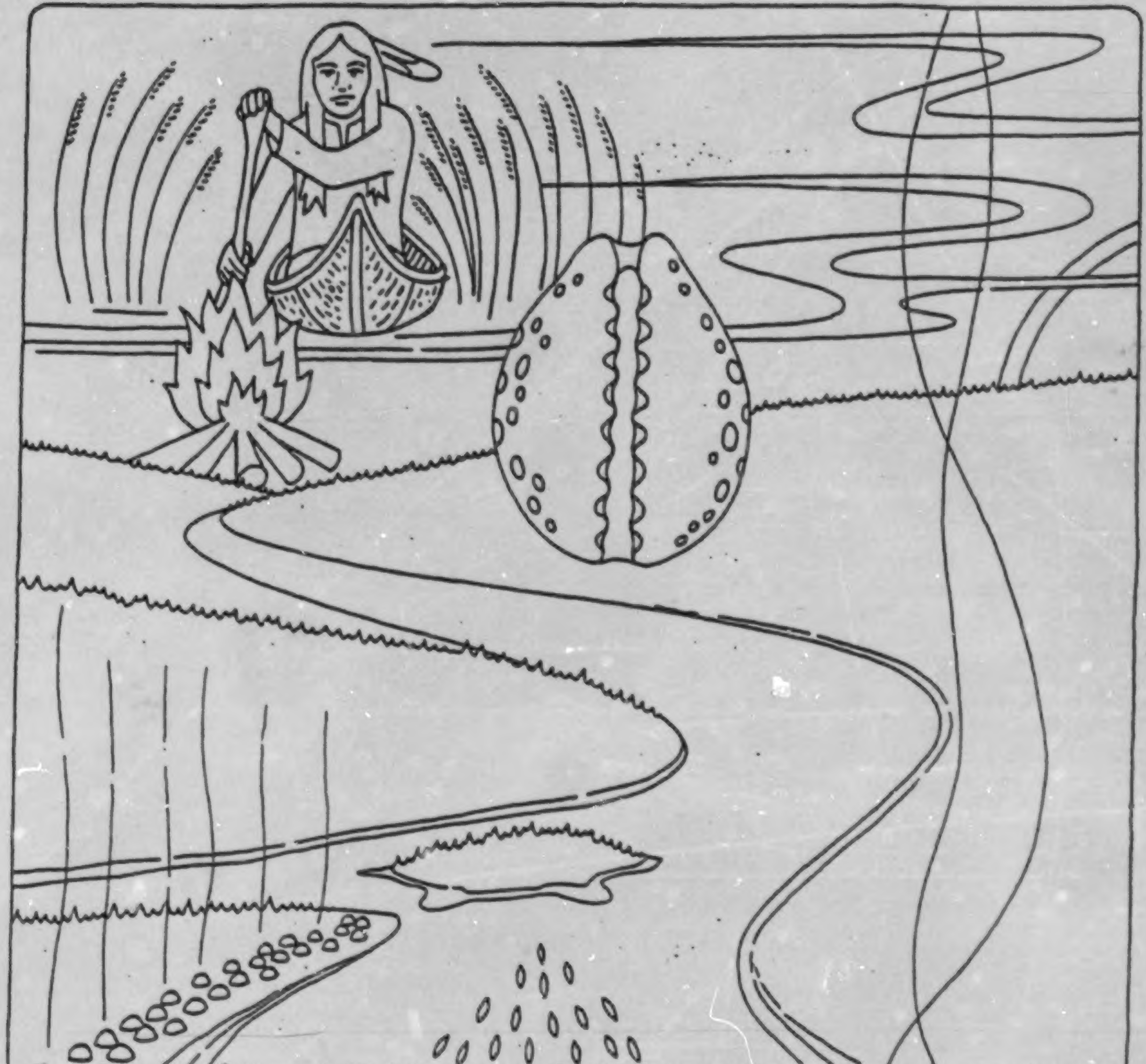






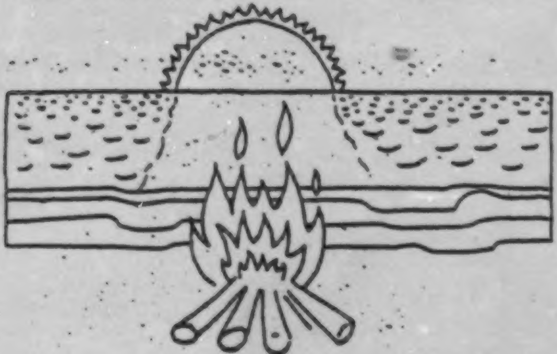
This fullness of life made many people doubt the predictions of the seven prophets. There was much discussion among all the Anishinabe about the migration and the prophecies of the Seven Fires. Huge gatherings were held to discuss the plans of the nation. Many people did not want to move their families on the journey to the West. Others were ready to follow the believers in the migration and give their unselfish support to what they felt was the Creator's plan. There was one group who supported the migration but who pledged to remain at the eastern doorway and care for the eastern fire of the people. They were called the Wa-bun-u-keeg' or Daybreak People.

BEST COPY AVAILABLE



The Ojibway followed the direction of the Sacred Shell on their migration.

Today, it is speculated that these were the people living on the east coast of Canada that the French called the Abnaki.

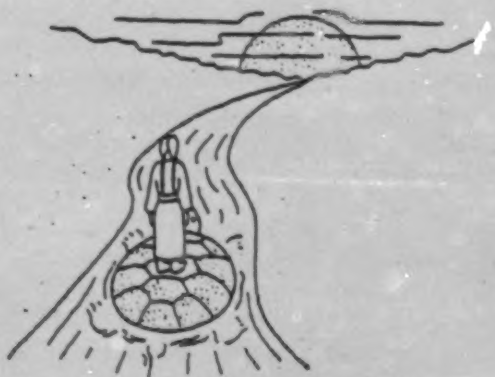


The prophet of the First Fire had told the people: "If you do not move, you will be destroyed." It would come to pass that most all those who stayed behind, including the Daybreak People, were destroyed or absorbed by the Light-skinned Race at the coming of the Fourth Fire.

The Mide people remembered the words of the prophet of the First Fire. He had spoken of a turtle-shaped mi-ni-si' (island) that would be the first of seven stopping places during the migration.

Some people thought that this island of the beginning of their journey was surely a place of great power and that they were to go there and await further instructions from the Creator. Others thought that those who accepted the words of the prophets should seek out this island and go there for Sweat Lodge and purification ceremonies. Still others felt that the search for the island was a test of their strength by Gitchie Manito. There was a great search throughout all the waters of the land for this island.

At last, a woman who was carrying a child in her womb had a ba-wa-zi-gay-win' (dream). In this dream she found herself standing on the back of a turtle in the water. The tail of the turtle pointed to the direction of the rising Sun and its head faced the West. The turtle was in a river that ran into the setting Sun.

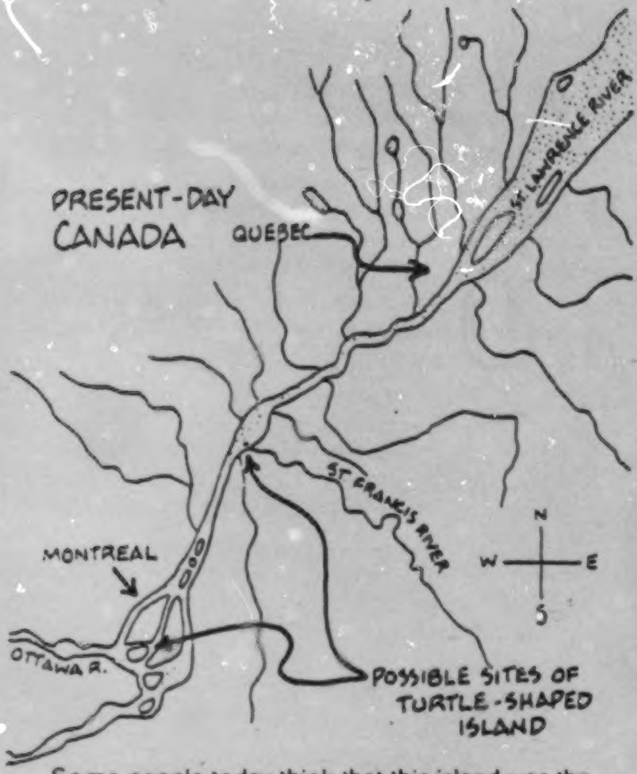


The woman told her husband of her dream. Her husband took the dream to the old men of the Midewiwin Lodge. These elders accepted this dream in its totality and instructed the people to explore the rivers in search of such an island.

Such an island was finally found in the St. Lawrence River. There has been much discussion today as to where this first stopping place of the migration was located. There is a place a short way northeast of present-day Montreal where the St. Francis River runs into the southern shore of the St. Lawrence. This is the only river of the region that flows to the West. At the place where this river joins the St. Lawrence there is a small island. Many years ago, the French found a fairly large Indian village on the mainland just across from the island. This island fits the description of the turtle-shaped island in the woman's dream.

·Y AVAILABLE

BEST COPY AVAILABLE



Some people today think that this island was the first stopping place of the migration. Others have pointed to a small island just where the Ottawa River joins the St. Lawrence at Montreal. The Ottawa River runs in line with the path of the Sun but it flows to the East.

It is likely that the main body of the migration camped on and around one of these islands. There were many Spirit Ceremonies and cleansing ceremonies held there as the people sought additional instructions.

After some time, the people resumed their journey to the West. They were told that along their journey they would have to stand and protect themselves from harassment and pursuit by other nations. They knew if they could stay true to the teachings of the Midewiwin that they would remain strong. The Anishinabe knew that they were to honor all and fear none. They were not to advocate war or violence, but when faced with conflict, they were not to shrink from it.

One of the major adversaries of the migrating Anishinabe was called the Nah-du-wayg.' They were the Six Nations that made up the Iroquois Confederacy.

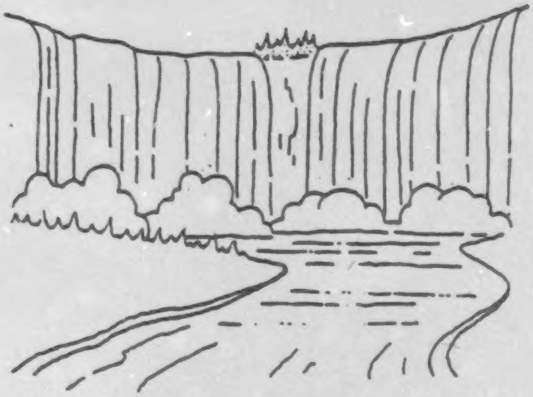
Along the migration there was a group of men who were charged with keeping the Manido ish-ko-day' (Sacred Fire). It was a flame that should never be allowed to die. The Sacred Fire gave strength to the warriors and kept the people of the migration together. All the campfires of the people were to come from the coals of this Sacred Fire. In this way continuity was given to the lives of the Anishinabe.

There were family groups and clan groups that differed in the interpretations of the prophecies. Some of these groups decided to stop along the way of the migration and set up permanent camps for their followers. It was said that from the head of the migration where the Waterdrum and Pipe were carried, the campfires of all the Anishinabe and their offshoots lit the landscape at night like stars for as far as the eye could see. Those that stayed behind were given their own flame of the original Sacred Fire.

It is now thought that the people slowly moved down the southern shore of the St. Lawrence River. Their second major stopping place was at the Ani-mi-kee' wa-bu (the place of the Thunder Water). This is very likely the place referred to by Waynaboozhoo on his journey to find his father

BEST COPY AVAILABLE

BEST COPY



and the place the the Ojibway later called Kichi-ka-be-kong' (Great Falls). The water and thunder came together here and made a powerful place. When the people stopped here, the Sacred Megis Shell rose up out of the water and greeted them. The Sacred Fire was moved to this location for some time. This place is better known today as Niagara Falls.

From here, the people moved to a place identified by one of the earlier prophets as "a place where two great bodies of water are connected by a thin, narrow river." This river was described as a "deep and fast ribbon of water that slices through the land like a knife." Many lives were lost in crossing this river. This third stopping place was very likely the shores of the Detroit River that connects Lake St. Clair and Lake Huron in the North to Lake Erie in the South. It is said that again the Sacred Megis appeared to the people out of the water.

It was at this second stopping place that the Anishinabe drove back a large group of Iroquois warriors who were pursuing them. Later, the Iroquois gave the Ojibway a Wampum Belt made out of a very special kind of shell. The O-pwa'-gun (Pipe) was shared among these two nations. At last peace was sealed between them.

In this period, three groups began to emerge in the Ojibway nation. Each group took upon themselves certain tasks necessary for the survival of the people. There came to be a very strong spiritual sense that bound these groups together.

The group called the Ish-ko-day'-wa-tomi, (fire people) were charged with the safekeeping of the Sacred Fire. As the people moved on the migration, this group guarded the coals of the Sacred Fire as it was carried along. These people were later called the O-day'-wa-tomi, and, still later, the Potawatomi.

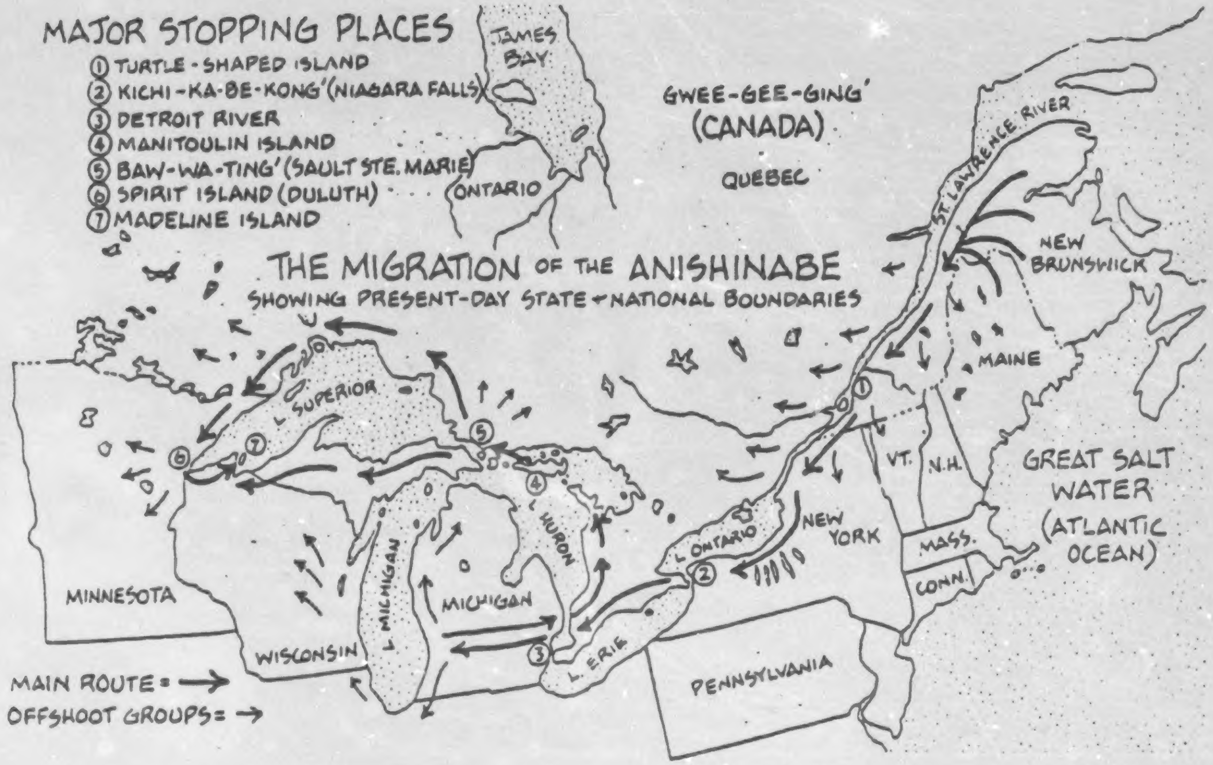
The group called the O-daw-wahg' (trader people) were responsible for providing food goods and supplies to all the nation. They took charge of the major hunting and trading expeditions. These people were later called the Ottawa.

The people that retained the name Ojibway were the faith keepers of the nation. They were entrusted with the keeping of the sacred scrolls and Waterdrum of the Midewiwin. These people were later mistakenly referred to as the Chippewa.

All the Anishinabe people became known as the nation of the Three Fires to recognize how these groups provided for all their needs.

There were those among the Three Fires that were known as peace makers. Others spoke out for military preparations to protect the nation. Still others felt the purpose of the Three Fires was to see that the prophesies were fulfilled. Huge gatherings of the Three Fires were held to discuss all of these things and decide on future actions.

By necessity, the alliance grew in military strength, but never was the spiritual origin and purpose of the Three Fires forgotten or


MAJOR STOPPING PLACES
① TURTLE-SHAPED ISLAND
② KICHI-KA-BE-KONG' (NIAGARA FALLS)
③ DETROIT RIVER
④ MANITOULIN ISLAND
⑤ BAW-WA-TING' (SAULT STE. MARIE)
⑥ SPIRIT ISLAND (DULUTH)
⑦ MADELINE ISLAND
THE MIGRATION OF THE ANISHINABE
SHOWING PRESENT-DAY STATE + NATIONAL BOUNDARIES
JAMES BAY
GWEE-GEE-GING' (CANADA)
QUEBEC
ONTARIO
ST. LAWRENCE RIVER
NEW BRUNSWICK
MAINE
VT.
N.H.
MASS.
CONN.
NEW YORK
PENNSYLVANIA
GREAT SALT WATER (ATLANTIC OCEAN)
L. SUPERIOR
L. MICHIGAN
HURON
L. ONTARIO
L. ERIE
MICHIGAN
WISCONSIN
MINNESOTA
MAIN ROUTE = →
OFFSHOOT GROUPS = →

abandoned.

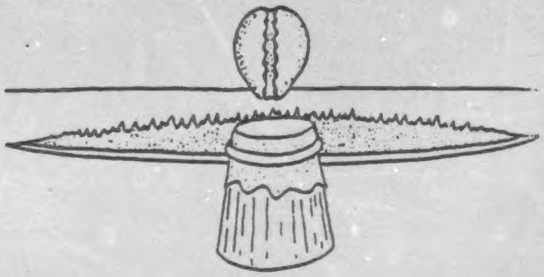
The Three Fires were later courted heavily by Indian leaders from East to join combat expeditions against the Light-skinned Race. Certain ones responded to these requests but never was there a massive military effort on the part of the Three Fires. If the entire strength of the Three Fires had been focused on military actions, then the history of this country would most certainly be different.

The people picked up the Waterdrum and continued their westward journey. They were attacked along the way by the nations later called the Sauks and the Foxes. The people pushed on until they came to a large body of fresh water. Here, the Sacred Fire rested for a long time. This is the place that was referred to in the prophecy of the Second Fire. It is possible that this camping place of the migration was on the eastern shore of Lake Michigan. At this point many people drifted off by groups to look for a place to cross the great water. They knew that their journey must take them to the West, but some of the people traveled South in an attempt to go

BEST COPY AVAILABLE

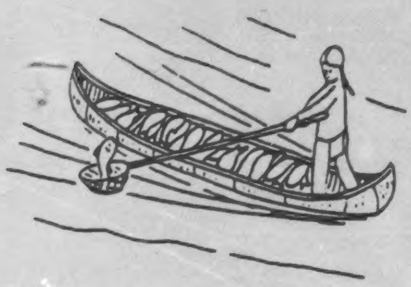
around the water. Many felt that the direction of the migration had become lost and that the people had missed their fourth stopping place. Time passed so that there were many births and deaths among the people. Giti-gan-nug' (gardens) were raised and o-day-na-wing' (villages) were established. As related in the Second Fire, people began to wander away from the teachings of the Midewiwin Lodge. Many became preoccupied with satisfying the things needed for physical survival but neglected the spiritual side of life. Many lost the direction in their lives that comes from Spirit Ceremony and Sweat Lodge. Only a few of the people, mostly elders, were able to keep the Sacred Fire alive. But the prophecies said that "a boy would be born to show the Anishinabe back to the sacred ways." It was prophesied that he would show the way to "the stepping stones to the future of the Anishinabe people." That boy did come among the people. He had a dream of stones that led across the water. The Mide people paid attention to this dream and led the people back to the river that cut the land like a knife. They followed the river to the North. The river turned into a lake, and at a place where the river was formed again, they rested awhile on an island. This island is known today as Walpole Island. They continued following the river further and came to the northern sea of freshwater that they had heard about when they first came to this region. They followed its eastern shore until, at last, they discovered a series of islands that led across the water. By moving the people by canoe, a way was found to the West over these "stepping stones." And so, the prophecy of the Third Fire came true for the people. They found "the path to their chosen ground, a land in the West to which they must move their families." Here they would find "the food that grows on water."

On the largest island in this chain, the Sacred Megis appeared to the Anishinabe. Here the people gathered. This is the island known today as Manitoulin Island. Slowly, the Anishinabe gathered until Manitoulin Island became known as the capital of the Ojibway nation. Here, the Midewiwin Way grew in following and the Clan System flourished. Truly, the boy with the dream did lead the people back to the sacred ways. Manitoulin Island became the fourth major stopping place of the migration. It is said that the voice of the Waterdrum could be heard even several days journey from Manitoulin Island.



For some time the main body of the migration stayed on this island, but it was not until the people settled at Baw-wa-ting' that the Waterdrum was given a home in which to rest and sing. Here again, the people found the Megis Shell. There was a small island here where powerful ceremonies were held. People now call this place Sault Ste. Marie. The fishing was excellent in the fast water. Skilled fishermen could run the rapids with a canoe while standing backwards in the bow. They would be carrying an ah-sub-bi' (net) on the end of a long pole. By the

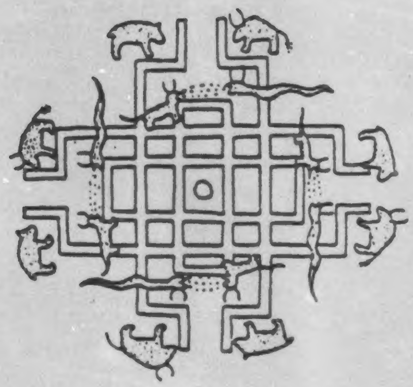
BEST COPY AVAILABLE

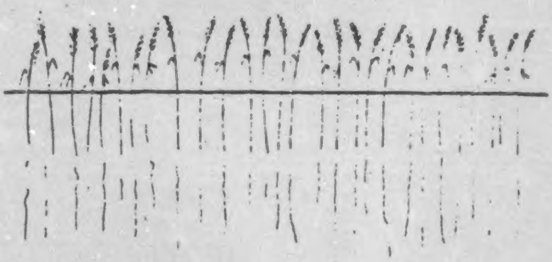


time they got to the quiet water of the river, their canoe would be full of beautiful Mi-ti-goo-ka-maig' (whitefish). There was so much food in the village that this place came to support many families. Baw-wa-ting' became the fifth stopping place of the migration. Many years later, in the time of the Fifth Fire, Baw-wa-ting' would become a big trading center between the Anishinabe and the Light-skinned Race.

From Baw-wa-ting', the migration split into two large groups. One group followed the shore of another great body of water to the West. The other group followed the northern shore. Both of these groups were attacked by the people they called Ba-wahn.' They were called this to denote their way of talking in deep voices. Their hunting territory was being invaded by the migrating newcomers and they fought fiercely. These conflicts illustrate the way that both of these nations were devoted to their purposes in life. The Ba-wahn' were later called Dakotas by the Light-skinned Race.

The northern group of Anishinabe carved muz-i-nee-bi' ah-sin' (rock markings) and symbols on the huge rock cliffs that led down to the great water. They marked sacred places and made records of their journey on the rock walls. They went all the way to the western end of the water. They named the bay there Wee-kway-doung'. Here they settled on an island. The Sacred Shell rose up to the people from the sands of its shore. This island today is referred to as Spirit Island at the west end of Lake Superior. Parts of the southern group came to this place, too. They also left carvings on the rocks along the southern shore of Lake Superior. It was near Spirit Island that the words of the prophets were fulfilled. Here the Anishinabe found "the food that grows on water." Here they found Ma-no'-min (wild rice).





Wild rice has always been regarded by the Ojibway as the sacred gift of their chosen ground. Any effort today to over-harvest or commercialize wild rice has met with failure. Wild rice has always

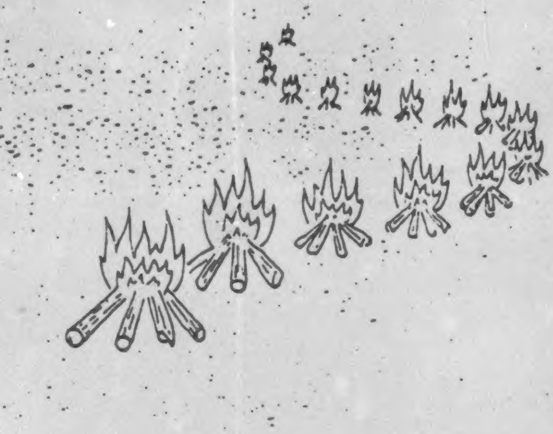
BEST COPY AVAILABLE

been generous to those who gather and use her in a respectful way.

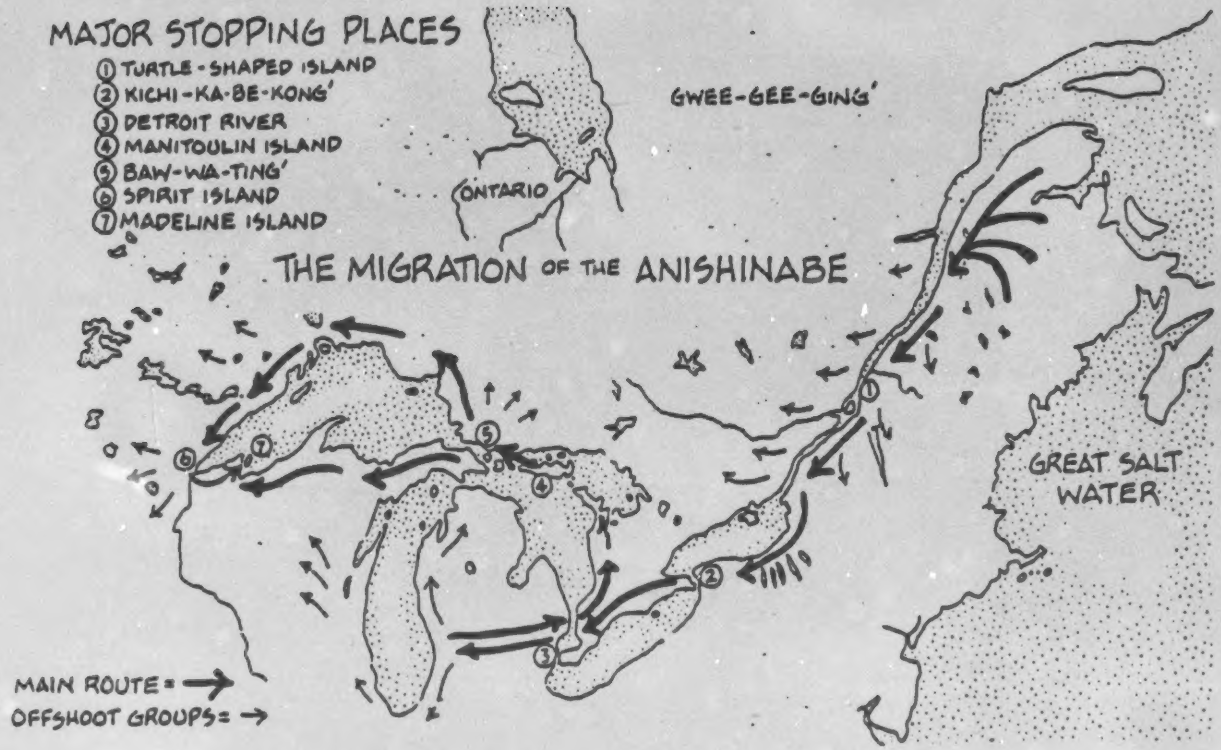
This island in the bay became the sixth major stopping place of the migration. The elders of the Midewiwin Lodge sensed that the long journey of their people was near its end. But something was missing. One of the prophets long ago had spoken of a turtle-shaped island that awaited them at the end of their journey. The southern group had seen an island fitting this description that lay in the water off of a long point of land. The people sought out this island and placed tobacco on its shore. The Sacred Shell rose up out of the water and told the people that this was the place they had been searching for. Here, the Waterdrum made its seventh and final stop on the migration. The Sacred Fire was carried here and here it burned brightly. This island was called Mo-ning-wun-a-kawn-ing (the place that was dug) by the Ojibway. It was later called Madeline Island. This name has survived to this day. The main body of the Anishinabe people gathered here and they became strong and powerful.

At last the migration to the chosen ground was at an end. It is thought that the migration started around 900 A.D. It took some 500 years to complete. It is amazing that the Sacred Fire could be kept alive for so long. The dream of the original seven prophets was carried for many generations. It was carried along a string of fires with many campfires left behind. That the people were able to accomplish such a thing is truly a miracle of the Creator.

We descendents of these great people can gather strength from their strength. We can gather courage for our lives today from their courage of yesterday.



BEST COPY AVAILABLE


MAJOR STOPPING PLACES
① TURTLE-SHAPED ISLAND
② KICHI-KA-BE-KONG'
③ DETROIT RIVER
④ MANITOULIN ISLAND
⑤ BAW-WA-TING'
⑥ SPIRIT ISLAND
⑦ MADELINE ISLAND
GWEE-GEE-GING'
ONTARIO
THE MIGRATION OF THE ANISHINABE
GREAT SALT WATER
MAIN ROUTE = →
OFFSHOOT GROUPS = →

Source:

*Edward Benton-Banai, *The Mishomis Book: Voice of the Ojibway,* Indian Country Press, St. Paul, Minnesota, 1979, pp. 94–102. Used by permission.

Study the map of the Anishinabe migration and add the following present-day names for land and water features as well as states, provinces and cities:

Niagara Falls
Salt Ste. Marie
Detroit
Duluth
Canada
Ontario
Quebec
Minnesota
Wisconsin
Michigan
St. Lawrence River
New York
New Brunswick
Pennsylvania
Atlantic Ocean
Lake Ontario
Lake Erie
Lake Huron
Lake Michigan
Lake Superior

Activity 9: Bartering-Indian And Voyageur Style

Bartering, the fur traders' favorite approach to commerce, is the basis of a classroom swap meet.

Grade Level: 4-6
Subject Areas: History, Language Arts, Social Studies, Economics

Bartering, the exchange of goods without money, is an ancient practice. It was the basis for a thriving industry between Indians and Europeans for two centuries, and among Indian cultures for thousands of years before that.

Copper was mined in the Keweenaw Penisula of Michigan and on Isle Royale in Lake Superior by Indians of the "Old Copper Culture" as early as 3000 B.C. Copper spear points and ornaments have been found in Indian burial sites as far away as Arizona. Copper was obviously a highly prized object for trade among Indian groups long before European cultures left the stone age.

Bartering is still a popular form of exchanging goods and services today. Used book stores will often take two paperbacks in trade for one. Industries sometimes exchange surplus chemicals and other products and by-products. Neighbors often exchange garden surpluses, babysitting services and house-watching. Bartering is a popular way to avoid taxes in many countries in the world, including this one. The Internal Revenue Service has established guidelines which require paying taxes on the value of services exchanged in a barter.

In this activity students read about the voyageurs who carried trade goods into the Midwest. After they practice bartering by listing objects they would agree to trade, students get down to business with items they bring from home or find in the classroom.

Procedure

1. Have your students read the attached description of the Woodland Indians and the voyageurs as background for their bartering activity.

2. Discuss bartering with your students. Ask them if they've ever traded something with a friend. Ask for suggestions of ways people they know swap or barter for services or products. Students can get a feel for the fur trade and practice bartering by answering the questions in the section on bartering, "Lets Trade."

3. Suggest a barter day and ask the students to bring five items from home to trade. Although the items should not be expensive (25¢ or less), the children will get more out of the experience if they use items they value personally. You will probably want to send a note to parents explaining the barter day. A sample letter is included.

4. On barter day, have students arrange their desks or tables in two rows with the "Indians" placing their barter objects on one side of the room and the "voyageurs" on the other. Allow students to roam around the room for a few minutes to check the "goods" without bartering anything.

5. Allow students to exchange goods. Stand back and watch your students in action. Some children might need to work in teams. When you or the students have had enough, call a halt.

6. Ask students to discuss their trades. Bring out their feelings of triumph and disappointment. Talk about "fair trades" and "unfair trades." The discussion may bring out the idea of standard values for goods - beaver pelts for Indians and voyageurs and dollars for us.

You may want to use some of the following questions to explore the students' experience in the swap meet:

- What did you like about bartering? What did you dislike about it? List at least five of each.
- What are the advantages and disadvantages of bartering? List at least five for each of these as well.
- How do we decide what are fair and unfair trades?
- Would you like to establish rules for trades before you did it again? Why?
- Is a bartering decision more or less difficult than a money decision? What are your reasons? Which items seemed to be the most difficult to negotiate? What attitudes and values seemed to help in reaching agreements?
- In what ways do you think the bartering we did is realistic? Unrealistic? How?
- How would you recommend improving this bartering game?

- Are there things that can't be bartered? What are they? How could you get them? Have your class brainstorm ideas.
- What items did you think about bringing but left at home because you weren't willing to lose them in bartering?
- If one of the values expressed is "to get the best deal" or "to get the most for your trade," ask how things might be different if their objective were *to show how generous and wealthy they were*. (In many cultures exchanges do take that form - bride doweries in some cultures are a display of wealth. Among some native Indian tribes giving more than was received was the goal.) How would our culture be different if this philosophy were law?

Taking It Further

1. Lead a discussion in which students develop a standard of value other than money for their goods. Such things as bubble gum, aluminum pop cans, one video game turn and other valuables may be suggested as payment for certain items. Have your students continue to barter, or set up a new barter day, using standard values. Discuss the differences between bartering with and without standard values.

2. If you have access to a computer try the programs "FURS" and "VOYAGEUR" available from: Minnesota Education Computing Consortium, 2520 Broadway Dr., Lauderdale, MN 55113.

> *FURS* simulates the North American fur trade of the 1770's. Students are sent on a fur-trading expedition that pits their courage and intelligence against the hazards of early exploration.
> *VOYAGEUR* challenges students' ability to explore the forests of northern Minnesota in the early 18th Century.

3. Take the bartering process to the environmental system. What would happen if each of us had to barter something in exchange for the benefits we get from the Great Lakes. Make a list of Great Lakes resources (i.e. fish, clean water, transportation, recreation, beauty, etc.). Ask students what would be a fair exchange for people for each item in the resource. If we thought of a fair exchange every time we used Great Lakes resources, do you think environmental conditions of the lakes would improve, get worse or stay about the same? Why? Is this a barter system? Why or why not?

4. Set up an "authentic" Indian/voyageur barter exchange. Collect objects which might have been traded on each side, or create them as drawings, fabric sculptures, etc. Students might enjoy reenacting a scene with half the class representing Indians, the other half voyageurs.

Resources:

Books

Butler, Beverly, *Song of the Voyageur*, Dodd, Mead and Co., New York, 1955.

Bierhorst, John, *Cry from the Earth*, Four Winds Press,New York, 1979.

Nute, Grace, *The Voyageur*, D. Appleton & Co., New York, 1931. Reprinted 1955 by the Minnesota Historical Society, St. Paul.

Sheppard, Sally, *Indians of the Eastern Woodlands*, Franklin Watts, Inc., New York, 1975.

Wilson, Keith, *Fur Trade in Canada*, Grolier, Inc.,Danbury, Connecticut, 1980.

Films

"Woodland Indians of Early America," 11 min., Color, Coronet, 1958. For primary and intermediate grades. Recreates an authentic version of the daily life of a Chippewa family as Little Bear and other members of the family hunt wild turkey, harvest the staple food of wild rice, fish and gather at the wigwam for the evening meal.

"The Voyageurs," 20 min., Color, National Film Board of Canada, 1965. Documents the often hazardous trips of the voyagers on their fur business canoeing routes and includes their songs and adventures. Appropriate for audiences from the junior high school level to adult.

The Woodland Indians

by Cathy May*

Indians, or Native Americans, lived in North and South America long before Europeans came. A group of Indian tribes we call Woodland Indians lived in the Great Lakes region when the explorers first started to land in America. To survive the harsh climate, the Woodland Indians became good at using what nature provided.

Job responsibilities were pretty evenly divided between men and women. Women built shelters, gathered food, cooked meals and made clothing. Men did most of the hunting, fishing and trapping.

Shelter and Food

"Wigwams" (named from the Indian word *wigass* meaning birch bark) were the homes of these Indians. To build them, the women cleared some brush from the land. Then they made a frame from thin poles. [The poles] were attached at the top to form a dome. This frame was about 12 feet [3.7 meters] long and 10 1/2 feet [3.2 meters] wide. Mats made from cattail rushes were tied to the framework to make walls. A space was left open so the bear skin door could be hung. The roof was covered with rolls of birch bark. An opening at the center let out smoke from the fire.

When the wigwam was finished, the Indians immediately started a fire [inside]. They tried to keep it going all the time because it was very difficult to start a new one. Dry wooden tools—a rod, a specially grooved piece of wood, and a bow—were used. By moving the bow back and forth rapidly, friction was created between the rod and wood block. Finally this friction caused a spark. The Indian blew on it so a flame would develop.

All the food eaten by the Indians was either caught, gathered in forests or was grown in village gardens. Roasted in the husks, corn was a favorite summer meal. Have you ever tried this? In the winter, dried corn was made into hominy or corn meal.

[Woodland Indians gathered most of their food in the woods.] Wild ginger, sassafras, wintergreen, bearberry and mountain mint were flavorings. Nuts such as chestnuts, walnuts and acorns were collected. All types of berries and fruits were picked.

The forest also provided material for clothing. Indian women made clothing from deer skin, which was the best material because it was warm and lasted a long time. It did not tear or puncture easily.

Before clothes were made from skins, the women tanned the hide. This process took a long time, for there were many steps. First the hair was scraped from the skin. Then the hide was treated with a prepared mixture and later stretched, softened, and smoked. Tanning gave the skin its fine qualities and a yellow or brownish color.

In addition to all these activities, the women took care of the little children. Indian women were never idle!

Fishing, Hunting and Trapping

The Indian men were responsible for fishing, hunting, and trapping. This was not an easy job. Often they spent many hours, or even days, away from their village tracking prey. Usually they hunted alone. They wore snowshoes to travel in the forests in winter. Canoes were used at other times of the year. During their spare time, the Indian men made new equipment or repaired old weapons.

Indians fished all year round. Fishing was especially important in autumn. If they were to have food during the winter, much of it had to be caught beforehand.

Fish were netted, speared and trapped. The Indians also used fishing rods and hooks. The rods were made from the trunks of young willow trees. Hooks were made from deer bones or the leg or wing bone of a large bird. Sinew was used for fish line. A piece of wood with a porcupine quill on top was the bobber. By twisting the line around their wrists and then around the canoe paddles the Indians trolled for fish.

Deer was the favorite game animal, but moose, fox and wolf were also prized. Some deer were killed with a bow and arrow when they came to a torch that burned all night. Deer were also attracted with a whistle that sounded like a young deer calling its mother. Sometimes a medicine was burned that smelled like deer's hoofs. The smell attracted the deer.

The Indians made all of their equipment. This task took most of their spare time. Making bows and arrows was their biggest job, for they had to have plenty of arrows. Arrowheads and spear points were made from a hard, brittle stone, such as flint or chert. A stone hammer was used to chip off pieces of stone until it was triangular. Then, the finishing shape was given with an antler tip. The Indian pressed on the bone and twisted, to 'press off' a chip. An Indian could make three arrowheads in ten minutes!

The arrow shaft was a smooth, straight stick about the size of your thumb. It was as long as the distance from a man's elbow to the end of his first finger. Each hunter put his own markings on the shaft. Then the arrowhead was lightly fastened with glue or sinew binding. Feathers were tied to the shaft with sinew. Usually feathers were dyed brilliant colors. A finished arrow traveled about 500 feet. An Indian could make ten complete arrows, including points, feathers, and shaft in a single day!

Bows were made from hickory or ash. The bows were strung with nettle-stalk fiber or the skin from a snapping turtle's neck. The neck skin was very good because it would not stretch or shrink and lasted a long time. The nettle-stalk fibres were treated with pitch to make them waterproof.

After the European settlers came, the Indians traded fur for iron tools and cooking utensils, cloth, and guns. As the years passed, the Indians became more dependent on the traders' goods. Many fine Indian crafts and skills were lost or forgotten.

Source:

*Cathy May, "The Woodland Indians," *Badger History, The Wisconsin Indians*, vol. xix, no. 1, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, WI, 1965, pp. 26-35. (Adapted and quoted by permission.)

The Voyageurs *

In the early 1600's the beavers of America became famous in Europe. All stylish European men wore felt hats made from beaver skins. As long as these big hats were popular, French traders made a living by trading with Indians in the Great Lakes region.

Trading permits were sold each year. The people who bought them were called the Bourgeois (boorshwa). They provided trading goods, canoes, hired the voyageurs and supplies. Each was allowed to send out four canoe-loads of goods. Five to eight voyageurs were needed for each canoe.

In the spring or fall, large numbers of canoes gathered on the St. Lawrence River. Packages of brass kettles, blankets, axes, beads, knives, guns, flints, ammunition and food filled the canoes. When all was ready, the voyageurs went to church to pray for success. Then with red caps bobbing, wet paddle blades flashing in the sunlight, they set out for the western country. They were on their way to gather the yearly harvest of furs.

Most voyageurs were French-Canadians. They were short men with strong arms and broad shoulders. They paddled the birchbark canoes over long distances.

[Although the large majority of voyageurs was men, a few women also engaged in the fur trade. Some were Bourgeois who bought the trading permits and provided goods, canoes, wages and supplies to voyageurs. Some were traders who lived most of the year in the wilderness. (See Activity 11, "TV Documentary" for descriptions of two women fur traders.)]

Canoeing was hard work. Voyageurs did not have an easy life. Living in the wilderness, they had few comforts. They spent each day in a canoe traveling over stormy lakes and on rivers strewn with hidden rocks.

Voyageurs liked colorful clothing. They loved bright- colored shirts and caps with red tassels. Gaudy sashes decorated their waists. These colorful paddlers loved to sing. They both danced and paddled to their French songs.

They usually ate two meals a day - morning and evening. Dried corn or peas boiled in a kettle, biscuits and fish were the main foods. A tasty broth was sometimes made from a certain kind of moss.

The trip from Montreal to the western posts and back was often a journey of 2,500 miles [4032 km.]. One of the main routes was up the Ottawa and then over Lake Huron. Later, a route through Lakes Ontario and Erie was used.

The first leg of the westward trip was to Mackinac. This journey took 35 to 40 days. The distance was about 650 miles [1048 km.].

Voyageurs traveled in large birchbark canoes. Freight canoes were used on the open waters of the Great Lakes. These canoes were 40 feet [12 meters] long, 5 feet [1.5 meters] wide and 3 feet [.9 meters] deep. Each was paddled by eight men. There was space for two passengers. Freight canoes carried 8,000 pounds [3629 kg].

Each night the canoe was unloaded and beached. The next morning the voyageurs reloaded their packs and began another day of hard work.

When the men got tired, they stopped and rested for ten minutes. This was just enough time to light up their clay pipes. So each stop was called a 'pipe'.

Distances between 'pipes' were decided by the difficulty of paddling. There was little reason to stop on a day when the canoe moved downstream with the current. When returning upstream, however, the voyageurs often stopped to rest and smoke.

At portages [places where the canoe and contents had to be carried from lake to river or stream to river] everyone worked. Bundles of trade goods or furs each weighed about 100 pounds. Canoes were not paddled to shore. This might have damaged the birchbark. Instead the goods were carried ashore [then someone paddled the canoe in and pulled it out of the water]. Bundles were carried across the portage first. The canoe was dry by the time the packages had been hauled. By then it was not so heavy to carry.

Voyageurs were experienced woodsmen. All knew the languages and ways of the Indians. They knew how to make canoes, and how to mend them when they were torn by snags or sharp rocks. They knew how to pack furs and judge the quality of beaver pelts. Voyageurs liked their work. They liked the freedom of the woods, the adventures of unknown places.

After exchanging trade goods for animal skins, the voyageurs returned to the Montreal area. When voyageurs arrived home after months in the wilderness, they wanted to celebrate. Their pleasures were simple, and usually noisy. Parties continued until all their money was spent.

The voyageurs had important work. They were links in the chain that made up the fur trade.

Sources:

•"With the Voyageurs", *Badger History, The Fur Trade*, Vol. xxviii, no. 2, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, WI, 1974, pp 24-31. (Adapted and quoted by permission.)

Resoures:

For a story about a 16-year old voyageur see:

"Julien, Boy Voyageur," *Badger History, French in Wisconsin*, Vol xxx, no. 1, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, WI, 1976, pp. 29-31.

Sample Letter To Parents

Dear Parents:

Our class is studying how the Woodland Indians and the voyageurs used bartering to exchange furs for other goods. In order to better understand the bartering process, the class will hold its own "Barter Day" on ________(day) ________(date). Each student is asked to bring to class some objects which she or he is willing to exchange.

EACH OBJECT SHOULD HAVE A VALUE OF TWENTY-FIVE CENTS OR LESS. However, it will make the bartering experience more realistic if the objects have some value to the student. Some examples of things which your child might bring are:

Items from any collection he or she makes (postage stamps, baseball cards, pop cans);
Mementos collected from visits to other places (rocks,shells, postcards, photographs);
Items she or he may have made (salt-dough ornaments, small toys, paintings or drawings); and
Small toys.

We think our "Barter Day" will be an exciting opportunity to directly experience a part of history and to explore our own values about trades and exchanges. Thank you for helping to make our activity a success.

Sincerely,

____
________________________________Grade Teacher
________________________________School

LET'S TRADE-

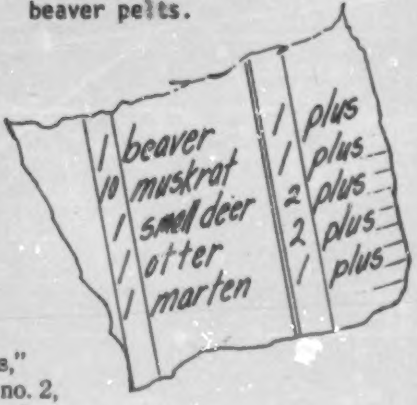
ANIMAL SKINS FOR TRADE GOODS

Source:

"Let's Trade—Animal Skins for Trade Goods," *Badger History, The Fur Trade*, vol. xxviii, no. 2, 1974, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, Wisconsin, pp. 34-35. Used by permission.

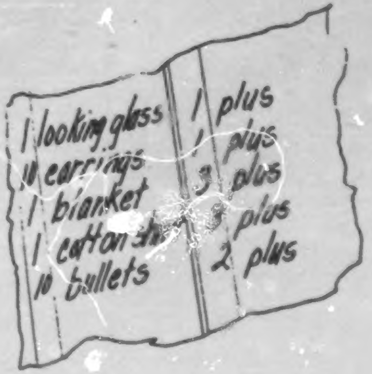
Traders kept supplies of blankets, brass kettles, gunpowder, cloth, beads and jewelry. Indians brought beaver and muskrat pelts, wild rice, corn, fish, or bear grease to exchange for goods.

Money was not used by traders and Indians. Instead, the worth of a beaver pelt became a standard of value. Each beaver pelt was worth a "plus." The worth of all other pelts was judged in terms of beaver pelts.



1	beaver	1 plus
10	muskrat	1 plus
1	small deer	2 plus
1	otter	2 plus
1	marten	1 plus

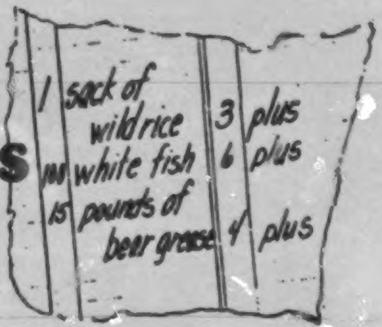
The worth of all trade goods was also based on the value of the beaver pelt or plus. A trader's book in 1804 lists the worth of goods:



1	looking glass	1 plus
10	earrings	1 plus
1	blanket	3 plus
1	cotton shirt	3 plus
10	bullets	2 plus

How many beaver pelts did an Indian need to obtain a blanket? a shirt? ten bullets?

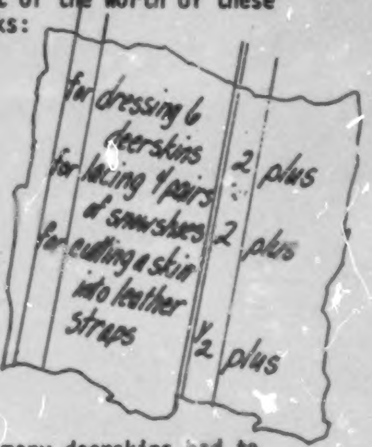
Indians often brought food to traders to exchange for goods. Here is a list of the worth of supplies:



1	sack of wild rice	3 plus
100	white fish	6 plus
15	pounds of bear grease	4 plus

How many bullets could an Indian obtain for 100 pounds of fish?

Sometimes Indians made repairs or provided services for traders. Here is a list of the worth of these tasks:



for dressing 6 deerskins	2 plus
for lacing 4 pairs of snowshoes	2 plus
for cutting a skin into leather straps	1/2 plus

How many deerskins had to be dressed to obtain a shirt?

If an Indian dressed four skins, what could he obtain from the trader?

Activity 10: Explorer's View Of The Great Lakes-Historical Perspective

Students appreciate the process of map-making by making their own maps, understanding the differing purposes of maps, and comparing Father Hennepin's 1687 map of the Great Lakes with a contemporary one.

Grades: 4-8
Subject Areas: Geography, History

We take our modern maps for granted. The technology of satellite and aerial mapping has taken some of the adventure out of going from here to there. In the days of the French explorers and fur traders, maps were carefully hand drawn. The explorers Marquette, Joliet and Champlain all were excellent geographers and map-makers. Since the major routes of exploration were by river and lake, maps made in the 17th and 18th centuries were quite accurate about the location of water routes but often distorted land shapes. The lower peninsula of Michigan was incorrectly depicted on maps until well into the 19th century.

Maps have many purposes. Contemporary maps may show roads, weather, political boundaries, natural resources, topography, agricultural products, vegetation, pollution and many other items (See Activities 17, 18, 19 and 20 for other types of maps of the Great Lakes region.) Historical maps of the 17th century were drawn by the Jesuit explorers for the use of later travelers. They showed locations of rivers, Indian tribes and forts in careful detail. (We now rely on road atlases for the same function.) Some maps were used for political purposes to show the territory claimed by a particular country. Some historians suspect that the Mississippi River was deliberately moved far to the west on many French maps because it was the boundary between the French and Spanish territories in America.

The historic map included in this activity was produced for Father Hennepin's books about his travels in the new world. It is not as detailed as the Jesuit maps and contains several elements designed to curry favor with the French king. Note that Lake Huron is named "Lac D'Orleans" honoring the royal family. In the upper left corner of the map, near the 260 degree line, the royal arms are shown fastened to a tree "at the place marked A." Whether such a landmark was ever really planted is questionable. Father Hennepin is notorious for stretching the truth in his writings. However his books helped to popularize the New World in Europe, gaining support for more exploration ventures financed by French entrepreneurs.

In this activity students make maps of familiar places, then compare the historical map to a contemporary one (included in the lesson). You will need to provide a road map of your state or province and the states of Wisconsin and Minnesota in order to complete the questions on the worksheet.

A wall-sized historic map of the trade routes to the New World is available for $4.00 (1983). It is a reproduction of a 1720 Dutch map and includes information on colonization and trade. To order your copy of "Colonization and Trade in the New World" write to the National Geographic Society, P.O. Box 1269, Washington, D.C. 20013.

Procedure

1. Briefly introduce the process of map-making by asking students why anyone would want to map an area. Discuss various uses of maps. Discuss how your students could make an accurate map of some familiar location (floor of the school building where your classroom is located or the classroom itself). Develop a purpose for such a map (such as showing new students how to reach the room, or showing cleaners exactly where to put everything back in your classroom after they've removed it to clean and paint).

2. Have each student sketch a map of the selected location in 10-15 minutes without talking to the other students. Put all the maps up on a bulletin board side by side. Talk about the differences in perspective as well as the various landmarks that each student put in. Ask: Which map has the greatest detail? The least? What do the maps include and exclude? What is absent from some maps that might make them difficult to use? Ask some of the map-makers: How did you begin? What problems did you have? How did you solve them? Who would you have liked to have asked for help?

3. Distribute copies of the Hennepin 1687 map and talk about what the map says. Ask: What do you see in the map? If you were traveling by river and lake, where would you stop to visit with other

European people? What does the map tell you about Indian people? What symbols does the mapmaker use to provide you with information? What are the horizontal and vertical lines? What are they used for? ("Septemtrion" at the top of the map is French for "north" or "northerly.")

4. Distribute copies of the worksheet and contemporary map included in this lesson. You will also need a road map for your state or province and the states of Wisconsin and Minnesota. Students will need colored pencils or crayons.

5. After students have completed the worksheet and maps compare their answers to questions 6-9. Discuss the differences.

Taking It Further

1. Compare these historic and modern maps to other maps in these activities. Discuss the uses of various maps.

2. Divide students into teams. Have them hide "treasures" (candies, video game tokens or other inexpensive but desireable items) and draw maps showing their locations. Groups exchange maps and hunt for treasures. When all treasures have been found discuss strengths and weaknesses of the maps.

Resources:

Books

Holling, Holling Clancy, *Paddle-to-the-Sea*, Houghton Mifflin Co., Boston, 1941. Shows various maps and routes through the Great Lakes.

Syme, Ronald, *LaSalle of the Mississippi*, William Morrow and Co., Inc., New York, 1953. Story of the explorer LaSalle who traveled through Lakes Huron, Michigan and Erie and down the Mississippi River. An exciting story full of physical hardships and dreams of opening up an inland empire of fur trading.

Films

"Map Skills: Using Different Maps Together," 11 min., Color, Coronet, 1971. Shows how to read descriptive facts from different maps of the same geographic area to discover relationships among human use of physical and social features of the area. Includes animation to compare maps showing rainfall, industry, transportation and population. (Intermediate and junior high)

"Maps are Fun," 10 min., Color, Coronet, 1946. Uses a visit by two boys to a cartographer for a map covering their paper route to introduce fundamental concepts of map reading. Explains legend, scale and color references. Shows mapping a community on a sand table, transferring it to a large-scale map, then reducing it. (Intermediate, junior high, high school)

Worksheet — Explorer's View

Study the historic map of the Great Lakes region and the modern one, then make the following additions described in numbers 1-5 to the historic map included here. When you finish answer the questions given in numbers 6-9.

1. Add the following modern names to features on the historic map:

Mississippi River
Lake Michigan
Lake Ontario
Wisconsin
Michigan
Ontario
Quebec

2. Locate the approximate site of the following by adding the names to the historic map:

The Soo Locks, Chicago, Detroit, Windsor, Ontario, Saginaw Bay (Lake Huron), Your Home Town

3. Use colored pencils to shade in the following areas on the historic map:

Great Lakes
Ontario
Minnesota
Wisconsin
Michigan
Illinois
Ohio

Make a legend showing the colors you have used and any other symbols on the map (your own or those already there).

4. A. Trace a route on the historic map that French explorers might have used to travel mostly by canoe from Lake Michigan to the Mississippi River.

   B. Trace a water route from Lake Superior to the Mississippi River.

   C. Trace a water route from Quebec to Lake Huron that doesn't go through Lake Erie.

5. A. On the modern map. Show how you would travel today from Lake Michigan to the Mississippi River. (Use a road atlas to help.)

   B. Show a modern route from Lake Superior to the Mississippi River. (Use a road atlas to help.)

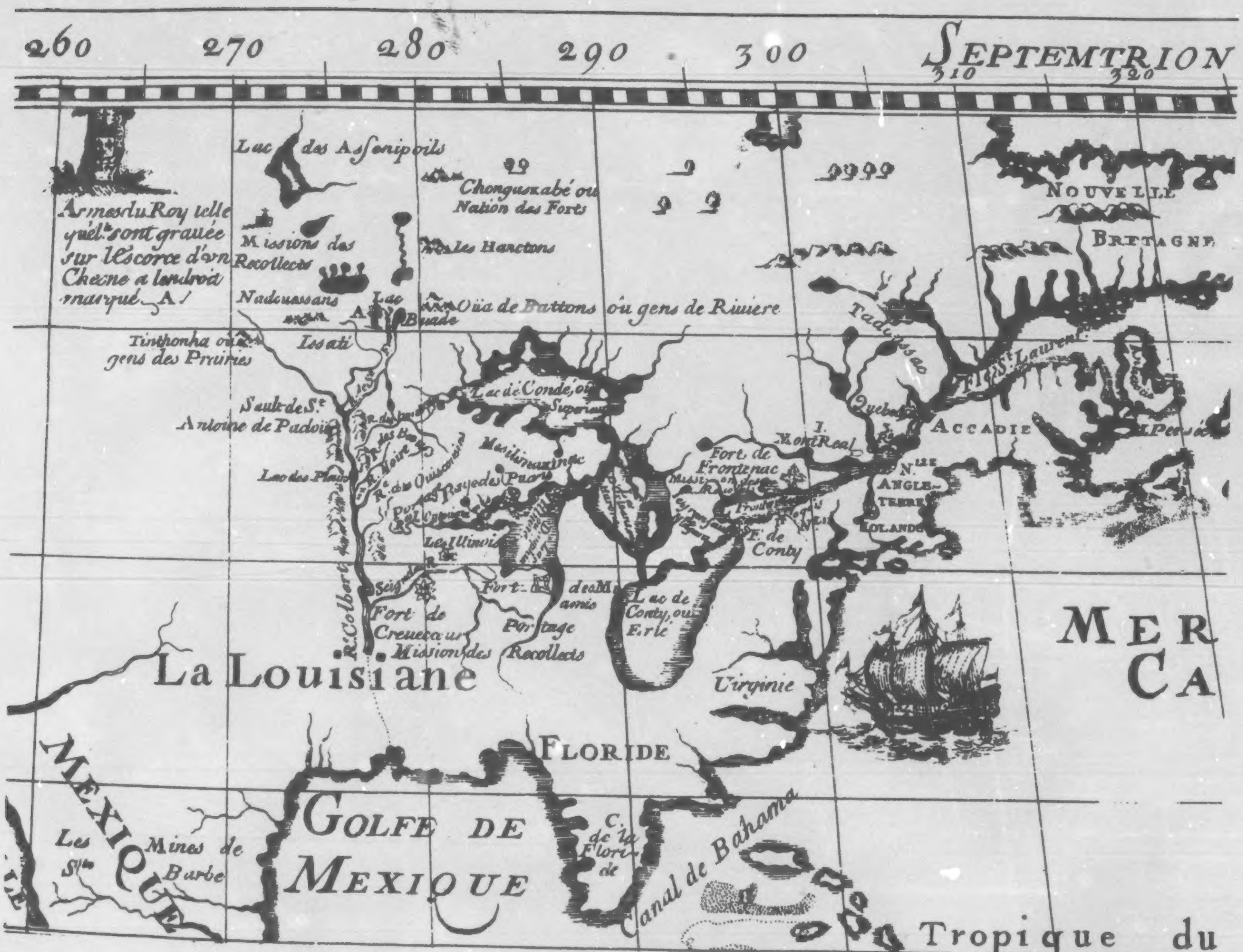
   C. Trace a route from your home town to the nearest big city on the Great Lakes.

6. Compare the historic and current maps. In what ways is the historic map different from the current one?

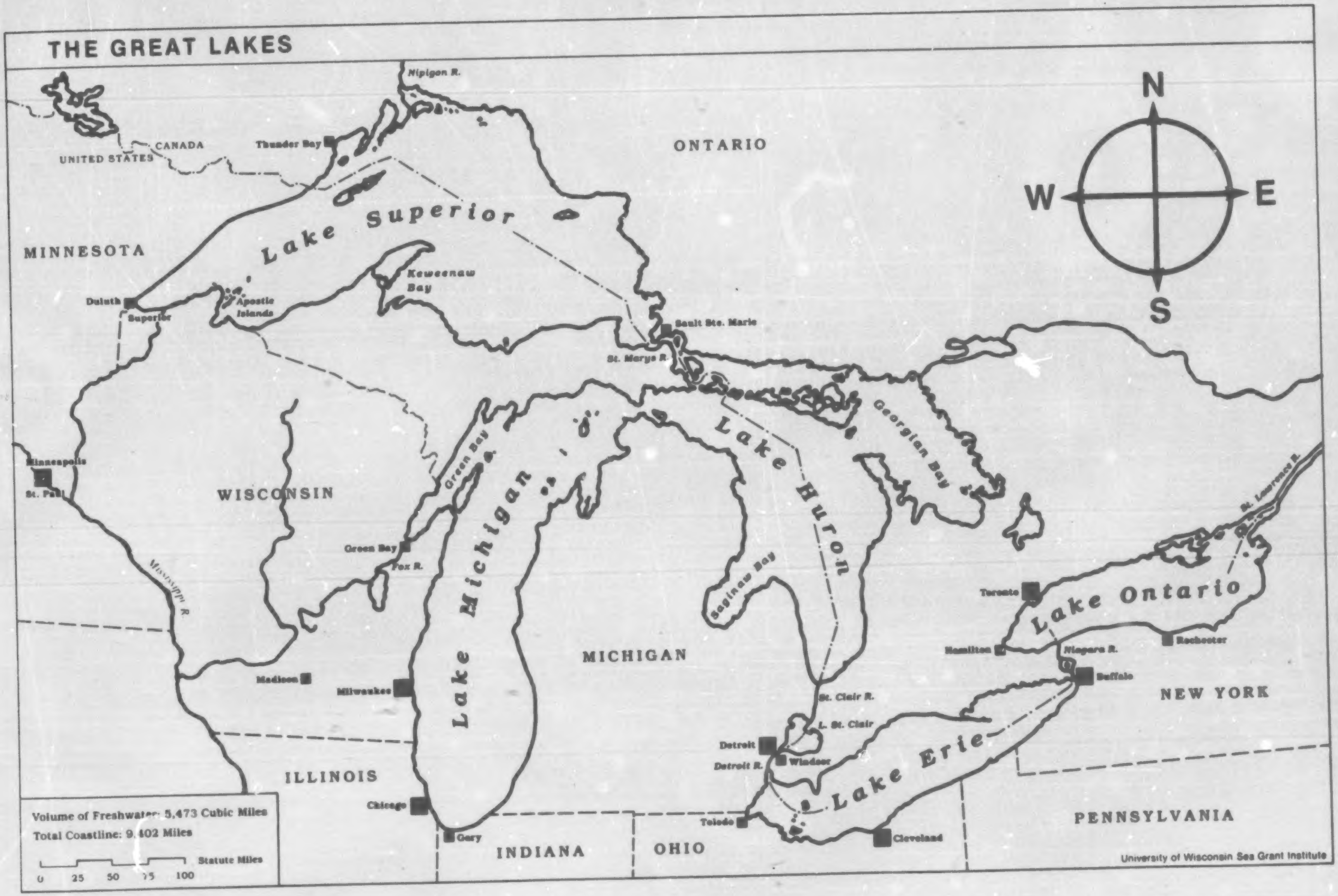
7. What are some reasons for the differences?

8. Imagine being an early explorer. What problems might you have because of the distortions of the 1720 map? What is the worst problem? The least problem?

9. Which way would you prefer to travel from Lake Michigan to the Mississippi: the explorer route or the modern one? Why?


260
270
280
290
300
310
320
SEPTEMTRION
Lac des Aſſenipoils
Chonguxabé ou Nation des Forts
Armes du Roy telle qu'elles sont gravée sur l'Escorce d'un Chesne a l'endroit marqué A
Missions des Recollects
Les Hanctons
Nadouassans
Lac A Buade
Oüa de Battons ou gens de Riuiere
Tinthonha ou gens des Prairies
Issati
Lac de Conde, ou Superieur
NOUVELLE BRETAGNE
Tadoussac
Fl. St Laurent
Quebec
Accadie
I. Mont Real
Sault de St Antoine de Padoüe
Lac des Pleurs
R. des Ouisconsing
Missilimakinac
Fort de Frontenac
N. lle Angleterre
Nlle Holande
F. de Conty
Les Illinois
R. Colbert
Fort de Creuecœur
Mission des Recollects
Fort des Miamis
Portage
Lac de Conty, ou Erie
La Louisiane
Virginie
MER CA
FLORIDE
MEXIQUE
Les Sts
Mines de Ste Barbe
GOLFE DE MEXIQUE
C. de la Floride
Canal de Bahama
Tropique du

BEST COPY AVAILABLE



THE GREAT LAKES

Nipigon R.
N
W
E
S
ONTARIO
CANADA
UNITED STATES
Thunder Bay
Lake Superior
MINNESOTA
Keweenaw Bay
Duluth
Superior
Apostle Islands
Sault Ste. Marie
St. Marys R.
Georgian Bay
Lake Huron
Minneapolis
St. Paul
WISCONSIN
Green Bay
Green Bay
Fox R.
Lake Michigan
Saginaw Bay
Toronto
Lake Ontario
Hamilton
Niagara R.
Rochester
St. Lawrence R.
Mississippi R.
MICHIGAN
Madison
Milwaukee
Buffalo
NEW YORK
St. Clair R.
L. St. Clair
Detroit
Detroit R.
Windsor
Lake Erie
ILLINOIS
Chicago
Toledo
Cleveland
PENNSYLVANIA
Gary
INDIANA
OHIO
Statute Miles
0
25
50
75
100

Volume of Freshwater: 5,473 Cubic Miles
Total Coastline: 9,402 Miles

University of Wisconsin Sea Grant Institute

BEST COPY AVAILABLE

Activity 11: What Happened To The Griffon?

After students read of the mysterious disappearance of LaSalle's floating trading post, *The Griffon*, ask them to write a story that explains what might have happened to it.

Grades: 4-6
Subject Areas: Language Arts, History

Shipwreck! Even in these well-settled times, that ancient call stirs the blood and the imagination. The French explorer LaSalle, the first to travel to the mouth of the Mississippi, knew about shipwrecks. He waited through a whole winter in the wilderness of Michigan and Wisconsin wondering where his ship, *The Griffon*, was, hoping it would soon return. But the ship was lost without a trace. Your students can exercise their imaginations by writing or telling stories of what happened to the ship.

Procedure

1. Read the story, "LaSalle's Floating Trading Post" or have your students read it aloud together.

2. Ask your students to discuss what they think might have happened to the Griffon.

3. Assign them to write the answer to the question from the point of view of a reporter/observer or by imagining themselves as the captain or one of the crew. They might even imagine themselves as *The Griffon* itself! They should provide details for their descriptions. For example, the reporter might note that he/she interviewed a trapper who found beaver dams made with bits and pieces of *The Griffon*.

4. Share the results in class and discuss. Talk about which stories seemed the most entertaining, realistic, exciting, silly, etc. Discuss why.

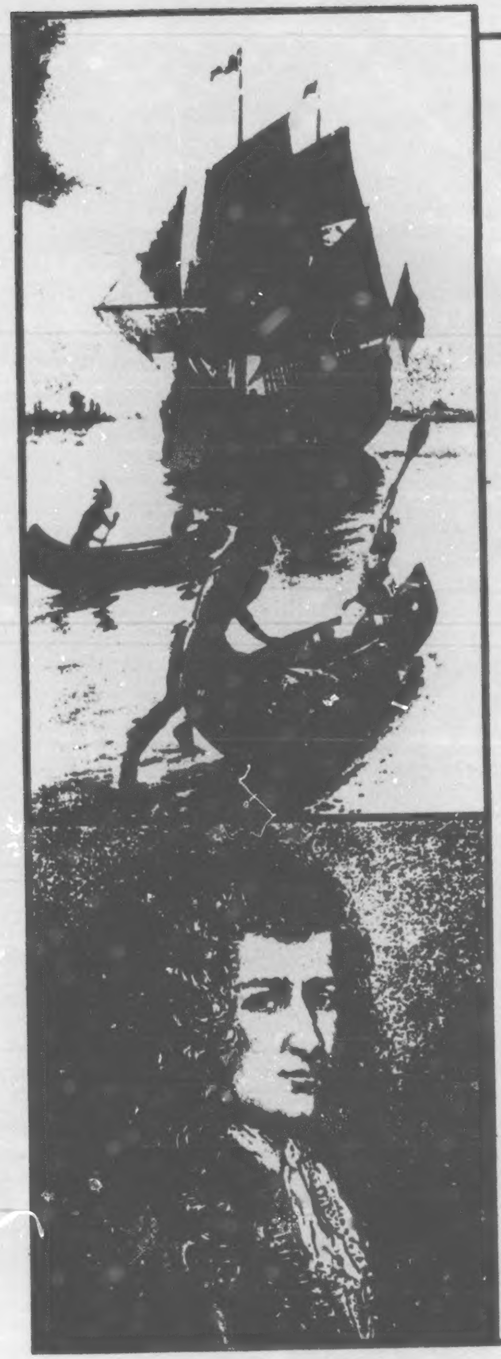
Taking It Further

1. Have your students draw pictures to illustrate what happened to *The Griffon*.

2. Present the stories as a play. Develop a filmstrip or collage of pictures to tell the story(ies).

3. Have the students imagine what LaSalle and his crew did as they waited long months for *The Griffon's* return.

4. Read other Great Lakes shipwreck stories. The books of Dwight Boyer and Dana Thomas Bowen are good sources of stories.



LaSalle's Floating Trading Post

by Peter Roop*

The early morning sun sparkled on the waves of Lake Erie. A small sailing vessel, the *Griffon*, rocked on her anchor chain. The *Griffon*'s 34-man crew could hear the rumble and thunder of Niagara Falls in the distance. La Salle, the ship's builder and commander, ordered the sails raised. The wind filled the broad canvas and the *Griffon*, the first ship to sail on the Upper Great Lakes, set forth on a voyage of no return.

In 1679, the year René-Robert Cavelier, Sieur (Sir) de la Salle built the *Griffon*, trading for beaver pelts was an extremely profitable and impor-

The 45-ton sailing ship, Griffon, *was built to allow for faster and greater trade with Indians of the Upper Great Lakes region. René-Robert Cavelier, Sieur de la Salle (1643-1687), was captain of the* Griffon.

State Historical Society of Wisconsin

tant business. The rich noblemen and women of Europe wanted hats and coats made from the luxurious pelts of the beaver and other animals. They were willing to pay high prices for these furs. But it was difficult and expensive to ship trade goods to the Indians in North America and to return the beaver pelts to Europe.

La Salle realized this and decided to attempt a bold, new method of transporting goods and furs. He would build a ship to sail the Great Lakes, a ship large enough to carry great quantities of trade goods to the Indians and which would then return to Europe with its hold filled with valuable skins and furs. His boat would be a floating trading post and fort, able to trade almost anywhere on the Upper Great Lakes. This unique vessel could also regularly supply the chain of forts and trading posts which La Salle dreamed of building from the Great Lakes to the Gulf of Mexico. If La Salle could make his dream a reality, France would soon control the fur trade and the vast interior of North America.

La Salle, a man of great daring and vision, had arrived in the New World from France in 1666. He was only twenty-three, yet he received permission from the King of France to build a fort and trading post near the thriving frontier community of Montreal. He also learned nine Indian languages so that he could better communicate with the natives of North America, the people with whom he would be trading.

La Salle heard many tales of the wonderful wealth in the unexplored wilderness which lay to the west and soon set in motion the plan that would lead to the construction of the *Griffon*. His idea was to build two identical sailing vessels, one to trade on the Great Lakes and the other to explore the uncharted Mississippi River. To undertake such a venture, however, required the permission of King Louis XIV of France. So La Salle returned to France to petition King Louis for the right to explore and exploit the western wilderness.

The king agreed to La Salle's scheme but gave him only five years to accomplish his task. La Salle realized that he had no time to waste and promptly ordered the ropes, sails, anchors, cannons, and other equipment necessary for his two ships. He hired blacksmiths, carpenters, and shipwrights to go to North America to build his two schooners in the wilderness.

The actual construction of the *Griffon* began in the winter of 1679. The ship's heavy gear had been transported to a place near the foot of the thundering Niagara Falls and then backpacked up the steep ridge of the Falls. A site along the shores of Lake Erie (near the present city of Buffalo, New York) was found to be ideal for the construction of the *Griffon*. For nine months, the ship builders were kept busy cutting white oak for the *Griffon's* timbers, forging their own nails, bolts, and axe heads, shaping an entire ship, two hundred miles from the nearest settlement.

Progress on the building of the *Griffon* was halted frequently because of the curiosity of the local Seneca Indians. These native people were fascinated and perplexed by the construction of this "giant canoe." They interfered with the *Griffon's* construction so much that, after her keel was enclosed, the ship was launched and her builders slept aboard her, finishing their work on the safer waters of Lake Erie.

La Salle named his 45-ton ship the *Griffon* in honor of his friend, Count Frontenac, who had a griffon prominently displayed on his coat-of-arms. A griffon was a mythical beast that was half lion and half eagle. Two griffon images were carved on the *Griffon*, one on her prow and one on her stern.

As soon as the *Griffon* was complete, she set sail, her holds filled with blankets, tobacco, guns, traps, iron pots and kettles, and many other articles to trade for pelts. The *Griffon* also carried the equipment for the second ship La Salle planned to build.

The previous fall La Salle had sent 15 men ahead to gather as many prime pelts as they could. La Salle hurried to meet these men because winter was rapidly approaching.

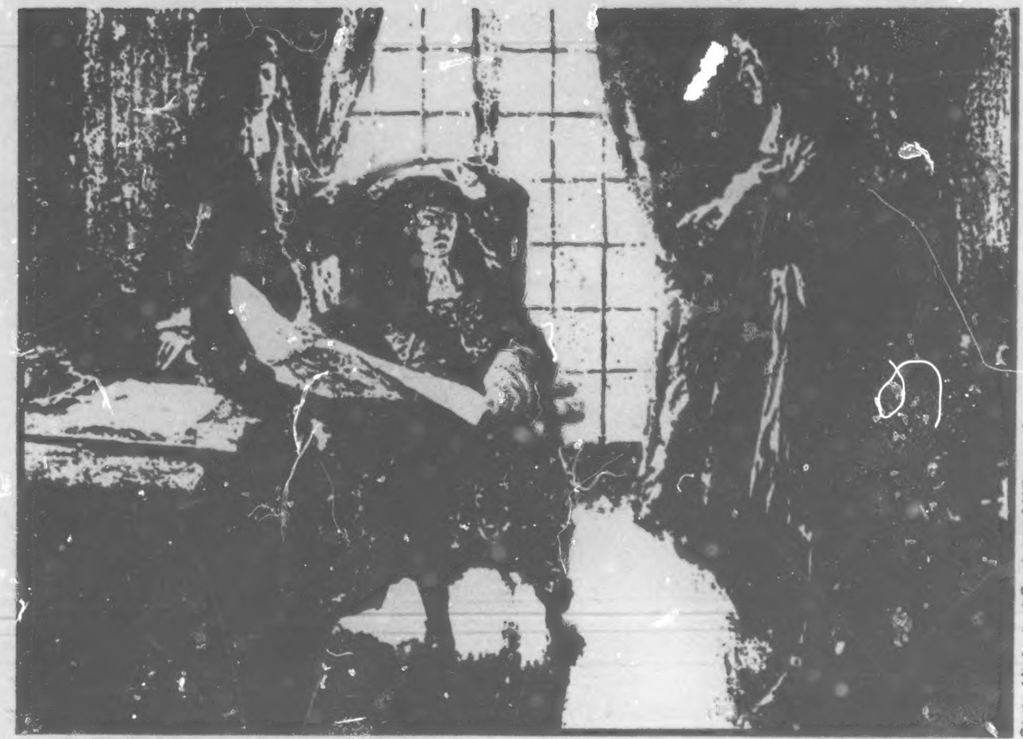
The *Griffon* sailed across Lake Erie, Lake Huron, and Lake Michigan. She stopped several times, either because of poor weather conditions or to trade. She proved herself to be a sound vessel and seemed well-suited to her fur trading mission. She was indeed an excellent floating trading post and would, if La Salle's dreams came true, dominate the fur trade on the Great Lakes.

In mid-September La Salle met a group of his men on Rock Island, a small island at the mouth of Green Bay. He was pleased to learn that they had collected enough furs to fill his ship. La Salle decided to send the pelts back to Niagara Falls immediately. The remaining trading goods and gear for the second ship were unloaded. The *Griffon's* holds were then filled with bundles of valuable furs and skins.

La Salle could spare only six men to return with the *Griffon* to Niagara Falls. He knew he was taking a grave risk with such a small crew. But he had to get at least one shipment of furs back before winter roared in.

On the morning of September 18, 1679, the *Griffon's* sails were hoisted, a farewell cannon shot was fired, and the stout sailing vessel began her long journey back across the lakes. La Salle gave express orders that when the furs had been unloaded and more trading goods obtained, the *Griffon* was to return to him as speedily as possible.

But the *Griffon* never did return. She disappeared somewhere on the broad Great Lakes. Some people said that she floundered in the tremendous storm which struck the Great Lakes soon after she set sail. Others reported that her pilot, already known to be untrustworthy, stole the cargo of furs and


State Historical Society of Wisconsin

La Salle had to petition France's King Louis XIV for permission to build the Griffon and to explore the Mississippi River. Later La Salle named the Louisiana territory in the king's honor.

sank the *Griffon* with the help of his five men. Still other reports said that Indians had attacked the *Griffon* and burned her to the water line. None of these reports were ever confirmed.

La Salle watched and waited for months for his precious ship to come back but to no avail. He didn't learn of her disappearance until the following spring.*

The loss of the *Griffon* was a staggering setback for La Salle and his dreams. Yet he remained determined and eventually did journey down the Mississippi to the mouth of this mighty river. He claimed the vast Mississippi River Valley for King Louis of France, naming it Louisiana in his honor.

La Salle never lived to see his chain of forts and colonies established. On a later mission in the New World, his men rebelled and murdered him. But La Salle did accomplish his dream of building a floating trading post. And although the *Griffon* disappeared before it could become successful, her name lives on in the annals of the North American fur trade as the first vessel to sail the Upper Great Lakes.

---

*Many historians and archaeologists have tried to locate the remains of the *Griffon*. Numerous people have claimed to have discovered the long-lost wreck, but these claims have been proven wrong.

Source:

*Peter Roop, "LaSalle's Floating Trading Post," *Cobblestone,* June, 1982. Ed. Mark Corsey, Peterborough, New Hampshire. pp. 28–31. Used by permission.

Activity 12: The Origin Of Lake Michigan And Other Legends

Students hear legends and then create their own.

Grades: 2-6
Subject Areas: Language Arts, Social Studies

In the days before television and electric lights a favorite pastime was telling stories. Fables and legends have been part of human heritage, from the ancient Greek myths to today's ghost stories told around a campfire.

In any culture stories have many functions: to entertain, to explain the origins of the world and human beings, to teach how to behave and what attitudes to take in certain situations (like bravery, cleverness etc.), and to preserve and perpetuate cultural values. Indian legends often reflect different values and perspectives than those of non-Indian cultures.

Often storytellers become fond of a character and create many stories about one person. Among the people of the northwoods, from Michigan to Washington, from Ontario to British Columbia, Paul Bunyan was a favorite. Among the Ojibway, Nanabozho was popular.

Apparently most legends which survive are about men characters. You may wish to talk with your students about how legends survive and how they change or are changed to conform with current social trends. Why are there so few women heroes in stories?

This activity includes two brief Paul Bunyan stories and four American Indian legends about the Great Lakes. Also included is a legend of the origin of Nanabozho and two Nanabozho stories. Depending on their age and skills, your students might create simple spoken or written legends of their own to tell about characteristics of the Great Lakes or about their own community.

Procedure

1. Establish a storytelling mood in the classroom. Get your students settled and ready to listen using your favorite techniques. Sing a song, play a brief record, turn out the lights, have everybody sit in a circle on the floor, etc. Read one or more of the following legends to your students or have them read the stories aloud to each other. Write unfamiliar terms on the board as they come up. Two which appear in the Indian legends are:

Getchi Munito
- one of many spellings of the Indian name for the greatest or most powerful spirit

manitou
- spirit (pronounced: man i too)

2. Work with your students to identify the elements of these legends. For example:

- How does the legend grab your attention?
- What does it try to make you feel/believe/understand?
- Does the speaker (or storyteller) in the story explain how the world works, how to act in some situations, or how to understand the unknown?

3. Work with students to discover topics they might use in writing or telling a simple legend. Some Great Lakes topics might include:

- How the sea lamprey got its teeth;
- Why the lamprey attack the trout;
- How the Apostle Islands, Manitoulin Island, Isle Royale, Washington Island, Pelee Island, Long Point, etc. were formed; how they got their names;
- How Lakes Michigan, Huron, Superior, Erie and Ontario were formed;
- Why the herring gull is white;
- How the lake sturgeon got its whiskers;
- Why the lake licks the shore;
- How the lake got its color.

4. Depending on the skill levels of your students, ask them to write stories of one paragraph to one page explaining a natural wonder. Remember: the pre-writing and first draft stages of creating a story need enthusiasm and encouragement. Save your suggestions about topic sentences, grammar and punctuation for a revised draft. You can begin by asking students to each make a list of elements (see question 2) they would like to include. Then ask them to place the elements in chronological order and to give concrete examples, e.g. bravery can be shown in middle of story when a young trout faces a sea lamprey.

5. Younger children can work together to tell story out loud. You can prompt them with questions like:

- What color was the herring gull long ago?
- What kind of personality did it have?
- What was its job?
- How did it relate to people?
- What happened between the gull and the people?
- What were their feelings?

6. Students may wish to share their legends. For dramatic effect you might create a "campfire" setting, sitting on the floor or ground in a circle.

7. Using the legends in this activity or the ones your students have developed, conclude the lesson with a comparison of two or more stories. Talk about different values and lessons the stories contain. For example: compare the Sauk Indian legend on the creation of Lake Michigan with the Paul Bunyan story of how Paul made the thumb of Michigan.

- What lessons are taught?
- How is human nature portrayed?
- What kind of attitude does the storyteller take?
- Are different values displayed? What are they?

Taking It Further

1. For an additional Indian legend activity see:

"NANABUSH," in *Lacustrine Lessons, Aquatic Projects for grades K-12*, Nov-Dec, 1982, Minnesota Sea Grant Extension Program, University of Minnesota, Duluth, MN.

2. Have children copy their legends neatly and illustrate them with pictures. Put them together into a book or a bulletin board display. One or more of the legends might also be developed into a play.

Resources:

Books

Coatsworth, Emerson and David Coatsworth, *The Adventures of Nanabush: Ojibway Indian Stories*, A Margaret K. McElderry Book, Atheneum, New York, 1980.

Felton, Harold W., *Legends of Paul Bunyan*, Alfred A. Knopf, New York, 1961.

Reid, Dorothy M., *Tales of Nanabozho*, Oxford University Press, Toronto, Canada, 1963.

Note: The legends included here were written down by non-Indian people who sometimes translated Indian words so they'd make sense to English-speaking Americans. Indians, however, had their own ideas of what spirits, for example, were like. As you read or hear these legends try to imagine being an Indian living a long time ago on the shores of the Great Lakes.

Lake Michigan

(Sauk Indian Legend)*

In creating the world Getchi Munito placed a lot of small lakes where Lake Michigan (Ketcikum) now lies. These were of all sizes — some very large and some very small. After a while these lakes began to quarrel with each other. Each wanted the best place for himself. This went on for some time. Then they finally decided to get together in a council to settle their disputes. The outcome of this meeting was that all the lakes, large and small, were merged into one great lake for the common good, and now, so the Indians say, we have Lake Michigan. This lake, although generally peaceful and quiet, sometimes gets very rough and wild. This occurs when some of the large and small lakes merged into the great lake and become restless and turbulent because they wish to be free again.

Source:

*Federal Writers Projects, Folklore Section, *Wisconsin Indian Place Legends*, Madison, Wisconsin, 1936, p. 1.

Bending Willow*

Seneca (Iroquois Nation)

Long ago, the young Indian maiden Bending Willow lived in the wigwam of her parents, not far from the great falls called Niagara. The tribe was at peace, the waterfowl and fish from the river were plentiful. But Bending Willow was very unhappy.

Although several young warriors sought her in marriage, the most persistent and most unwelcome suitor was the chief, a cruel old man rightly named No Heart. His hair was as gray as a badger and he had already buried three wives. However, he had great power in the tribe, and when he declared that he would take Bending Willow for his next wife, her parents dared not refuse him.

Bending Willow had another reason for sadness; she had no living brother or sister to help or advise her. They had died from the mysterious sickness that so often attacked members of the tribe. Since her close friend, Laughing Water, had been taken, Bending Willow felt very much alone.

The tribe blamed an evil spirit loose in the village for the mysterious sickness. Chief No Heart proclaimed that the marriage celebration of a chief would drive away this evil spirit. Then he set the day for the ceremony.

When Bending Willow was told of this, she ran into the forest to be alone and think. She would not marry Chief No Heart. She did not believe the mysterious sickness would disappear if the marriage took place. At last she could think of only one solution: she must leave the village and escape to the lands across the wide river.

Early the next morning before dawn, when all were sleeping, she dragged her father's canoe to the edge of the river, stepped into it, and paddled swiftly out into the current.

The night was still dark, with very few stars gleaming in the blackness above her, and the current at this time of the year was much stronger than she had expected. She paddled with all her strength for some time without success. Instead of making her way across the wide river, she found herself at dawn headed toward the rapids.

The paddle was torn from her hands as the canoe tossed about wildly, like a withered branch, on the white-crested waves. The roar of the great falls filled her ears. Swiftly but surely she was borne towards the rocks at the edge of the great falls.

She raised her eyes to the distant star still gleaming steadily in the morning grayness above. If only the Star Maiden would lift her up to the heavens!

"I would rather be up in the sky forever than down at the bottom of the river!" she thought.

For one moment only she saw the bright white and green foam of water. Then she felt herself lifted on great white wings above the rocks. The water divided and she passed into a dark cave behind the foaming spray.

In the cave was a small creature with a white face and hair of soft white mist, like the mist that rises from the base of the falls. It was the water spirit, Cloud-and-Rain, who had rescued her and taken her into his lodge. The door of his lodge was the green wave of Niagara, and the walls of the cave were of gray rock studded with white stone flowers.

Cloud-and-Rain gave her a warm wrapper and seated her on a heap of ermine skins in a far corner where the dampness was shut out by a magic fire. He brought her fish to eat and delicate jelly made from mosses only the water spirits can find.

When she was rested, Cloud-and-Rain told her he knew her story. "No Heart is not a wise leader for your people," he said. "The campsite of the village is a bad one. It is too close to the swamp. When the sickness came, he did not listen to the elders' advice to move."

"You know of the mysterious sickness!" cried Bending Willow. "It has taken my brothers and sister and my friend Laughing Water. No one knows what evil spirit brings it or how to drive it away!"

"There are herbs to help and knowledge of how to use them. That I can teach you." Cloud-and-Rain was silent for a time. "Yes, there are many things I can teach you that will help your people. The water of your village is bad, poisoned."

"Poisoned?" Bending Willow stared at him in perplexity. "What evil spirit did that? I do not understand."

"Listen carefully if you would save the lives of your tribe," said the water spirit Cloud-and-Rain. "A great serpent lies underneath the ground of your village. He poisons the springs from which you draw the water to drink. When people die, the serpent is pleased, and more and more poison seeps into your spring. Even now the spring that No Heart uses is fouled, and he will soon die."

"If you can teach me how the village can get rid of this evil serpent, I will stay with you gladly," said Bending Willow.

"When you return," said Cloud-and-Rain, "you must persuade your people to move their camp. Let them come to dwell nearer to me, in the high upland."

Bending Willow stayed three months with Cloud-and-Rain. He taught her much medicine skill, and showed her the herbs to cure sickness.

One day when he came in from fishing, he said to her, "Chief No Heart is dead." This night I will throw a bridge from the foot of the waters across the falls to the high hills. You must climb it without fear, for I will hold it firmly until you are on the land.

When the moon rose, casting a gleam of silver on the waters, Cloud-and-Rain caused a gentle wind to raise the spray until it formed a great white arch reaching from his cave to the distant hills. He led Bending Willow to the foot of the bridge of mist and helped her start off. Higher and higher she climbed, brave and confident, until she descended the misty arch onto the high upland.

When she returned to the village, the tribe welcomed her joyfully. No one blamed her for leaving the tribe to escape marriage with No Heart. They listened quietly when she told them of the water spirit Cloud-and-Rain, and of the medicine wisdom he had taught her. But they would not agree to move their village to the uplands.

"The swamp is a protection against enemy attack," they said. "And there are plentiful fish and waterfowl here."

"The upland farther down the river is safer," she answered. "The water is pure. There are many herbs and plants to cure sickness. Here the water springs are poisoned by an evil serpent spirit who lies hidden under ground." But they shook their heads in disbelief.

When the tribe would not accept the wisdom she had brought from the water spirit, Bending Willow at first felt discouraged. But the months she had spent with Cloud-and- Rain had given her confidence and courage, as well as wisdom. She spoke to her mother and other women of the village separately. Several of them were persuaded that the water spirit's advice was sound.

Bending Willow led these women to the high uplands to draw their water from the clear springs bubbling out from the rocks. Then the women carried the water carefully back to the village. They did this for several months. Neither the women nor any of their families who used this water fell ill. Of those using the village water, some sickened and among them were strong warriors as well as two of the new chief's children.

This was enough to convince the new chief. The tribe held a council and voted to move. They took down their lodgepoles and moved the village to the uplands.

There the tribe lived in peace and good health. Bending Willow shared her knowledge of herbs with the women of the tribe. And before many months had passed, she happily married a young warrior of her choice.

Source:

*Ethel Johnston Phelps, *The Maid of the North-Feminist Folk Tales*, Holt, Reinhart and Winston, N.Y., 1981, pp. 149-153. Used by permission.

The Origin Of Mackinac Island*

Mackinac Island rises from the straits between Lake Huron and Lake Michigan. The name has been shortened from Michilimackinac, the original name given it by the Indians who, for many generations, used the rocky island as a gathering place.

As seen from near Woody Island, it is said to "have exactly the form its name implies, that of a large turtle sleeping on the water."

****

Long ago when the world was very young, and all the living creatures were wandering over its surface looking for the best place to live, a large number of turtles came to the southern shore of what is now called Lake Erie. They found the land generally level, and they were delighted with the muddy waters of the lake and also with the many stagnant ponds near it. Most of the turtles liked the spot so well that they wanted to settle there.

But the leader of the band, a huge turtle, was determined to continue his journey. He was lured northward by strange lights, lights of unusual loveliness, which he had often seen moving across the distant horizon. The leader tried to persuade some of the band to go with him, but they refused. Disappointed but not discouraged, knowing that the summer was but half gone, he made up his mind to travel on alone.

He journeyed slowly, often stopping to rest and to feed along the many beautiful swamps and bayous on his way north. When the second half of summer and most of autumn had passed, he had gone no farther than a point of land which then partly divided Lake Huron from Lake Michigan. Already he had been numbed by chilly winds, but he was still determined to complete his pilgrimage. The strange lights still lured him.

On the day when he set forth upon the waters for the last part of his journey, the winds were cold and ice began to form. In a short time he could move no farther. An icy barrier had formed round him and soon he was frozen to death. He was only a little black spot on the waste of frozen waters.

The winter snows passed, spring returned, the ice melted. Again the lakes were a beautiful blue. But the shell of the huge turtle remained fastened to a tall reed. As the years went by, it grew into an island, which the Indians named Michilimackinac, meaning "the Great Turtle."

Source:

*Ella Elizabeth Clark, *Indian Legends of Canada*, McClelland and Stewart Limited, Toronto, Canada, 1960, p. 90. Used by permission.

The Storms On Lake Michigan*

Long, long ago a wicked manitou dwelt in the country about Little Traverse Bay. He was called Motche Manitou. One day the people held a council, and decided to put a stop to his evil deeds. They took Motche Manitou and threw him into the bay. There he lies to this day. Once in a while he tries to get out. Then the water is disturbed, and furious storms rage over the lake.

Source:

*Johanna R.M. Lyback, *Indian Legends*, Lyons and Carnahan,Chicago, 1925, p. 164-165.

The Coming Of Nanabozho

Dorothy Reid*

Know then that when the world was new the Ojibwa had much to learn. Observing their difficulties, Gitche Manitou, the Great Spirit, took pity on them and in his wisdom sent them a teacher.

In those far-off times a wise old woman lived among the people. Her name was Nokomis and she was a daughter of the moon. Indeed she had once lived upon the moon with her husband. But a jealous woman had pitched her into the centre of a lake and she had fallen through to the earth. There she gave birth to a daughter and named her Wenonah.

The girl grew tall, and skilled in the ways of the forest. The fame of her beauty and gentleness spread far among the tribes, and many braves came to Nokomis, each seeking her daughter for his bride. But Nokomis did not want to part with her only child, and she refused all who came, saying that Wenonah was still too young to leave her home.

One day the maiden was walking alone in the forest. Suddenly the West Wind swept down upon her, bending the trees out of his way and roaring with anger. He seized the terrified girl and carried her to his lodge in the Mountains of the West. There she dwelt among the cold high peaks. She was lonely when the West Wind was away, but when he was at home she feared his rough ways and the boisterousness of his sons, the winds of the North, South, and East. She yearned for her home in the forest and for her mother.

Nokomis sought Wenonah far and near, calling her name longingly through the forest. At last the Eagle took pity on the old woman and told her that the West Wind had carried Wenonah away. Nokomis knew she could not prevail against so strong and adversary, and she resigned herself to spending the rest of her life alone.

One evening as Nokomis was gazing far to the westward, she heard a low voice calling her name. At first she thought it was only a trick of her imagination; then she saw her daughter approaching and hurried to meet her. Wenonah was so exhausted from her long journey and her many hardships that she could scarcely walk. In a faltering voice she told her mother how the West Wind had grown weary of her grief-sticken face and driven her out of his lodge.

Shortly after Wenonah returned, she gave birth to two sons. Then, worn out by all her hardships, the gentle girl departed to the Land of Spirits, taking one of her sons with her.

The grieving old woman wrapped the living child in soft grass and placed over him a large wooden bowl to protect him from harm. She buried her daughter and the other child, then sank to the ground, "Wahwonowin!"** she moaned, rocking to and fro. "My daughter is dead!"

For many days she sat lamenting, and she too might have died of grief had not a rustling from beneath the great wooden bowl caught her attention. Only then did she remember the baby she had placed there.

Nokomis hurried to pick up the bowl. Great was her astonishment when she found a small white rabbit. Already the Great Trickster had begun his magic. Weary of waiting for his grandmother to bring him food, he had changed himself into a rabbit so that he could eat the grass around him and not starve.

Nokomis was filled with remorse. She picked the animal up and caressed it, calling it her Nanabozho, her rabbit.

Nanabozho grew rapidly. Being the son of the West Wind and the great-grandson of the Moon, he was more than human and could change himself into many marvellous things-a bear, a tree, a snake, sometimes even a rock to trip his enemies. But his [favorite] shape was that of a strong young brave. When he walked, the earth trembled, and the sound travelled down to the dwelling places of the evil spirits. Hearing it, they knew that a great manitou*** had been born on the earth, and that they must destroy him lest he conquer them. Nanabozho's life on earth was to be a long war against these evil spirits.

Nanabozho had many adventures. He often performed great deeds for the Ojibwa people. Many were the stories told about him, and wherever you look in the woods and lakes, there is something to remind you of Nanabozho. The marks on the trunks of the white birch trees, the flying V of the wild geese winging through the sky, even the great rocks that dot the landscape-all are part of his work. The earth itself was remade by him following the great flood. When at last he lay down to take his long sleep on Thunder Cape, out in Lake Superior, he had left many marks on the things of this world.

**A cry of mourning for the dead

***Spirit

Source:

*Dorothy M. Reid, *Tales of Nanabozho*, Oxford University Press, Toronto, 1963, pp. 13-17. Used by permission.

Nanabush And The Porcupine

Emerson & David Coatsworth*

In the days when Nanabush lived on earth, the porcupine was without quills and, instead, wore a coat of smooth fur, much like his cousin the beaver. Because the porcupine was just as slow moving then as he is today, he lived in great danger of attack by larger and fiercer animals. Nanabush always pitied the poor porcupines, who were friendly toward him and had helped him in one way and another many times.

One time, in his travels, Nanabush saw a porcupine being chased by a bear. The porcupine lumbered off into the woods and disappeared. Nanabush hurried to see if he could help the little animal. He found that the porcupine had crawled under a prickly hawthorn tree, and the bear could not attack him without being badly scratched by thorns. Soon the bear tired of trying to reach the porcupine, and went off in search of easier game.

"Well, brother Porcupine, at last I know how I can help you in return for the [favors] you have done me. Stay here a little longer while I go down to the river."

Nanabush went to the river and, before long, returned with a great armful of wet clay. He daubed the porcupine's back with the clay until he was well covered. Then the mighty magician pulled thorns from the hawthorn tree, peeled them, and stuck them in the clay. The peeled thorns turned white, and Nanabush, with his magic, turned the clay into skin. Off went the porcupine, as happy as could be for, thanks to Nanabush, he and his descendants had gained the protection they needed against larger and swifter animals who would otherwise have harmed them.

Source:

*David and Emerson Coatsworth, eds., *The Adventures of Nanabush*. Copyright 1979 by Doubleday Canada Ltd. Reproduced with the permission of Atheneum Publishers. (A Margaret K. McElderry Book), pp. 70-71.

The Helpful Turtle

Emerson & David Coatsworth*

In the early days of the great magician, Nanabush called together as many of the birds and animals as he could find, and gave them their duties. He told the beavers to keep themselves busy building dams; he told the bees to make honey; he instructed the woodpecker to make forest music by drumming on the trees; and so it went until every bird and animal had been given his duty. Every bird and animal, that is, except the turtle. When Nanabush called the others to his wigwam, Turtle was swimming about far under the surface of a great lake and, of course, being so far down under the water, he had not heard the call. When he came to the surface at last and heard what had happened, do you think he went to Nanabush to find out what his duties would be? Not at all. Instead, he sulked.

"If Nanabush wishes to give duties to me," he grumbled, "it's up to him to come and tell them to me. I won't waste my time going to see him."

And with that, the turtle sank down beneath the surface of the great, deep lake, and went on sulking. He stayed below for many days, and the longer he stayed, the angrier he grew. Finally, he became so angry that when he saw a canoe going by above him, he swam up to it as fast as he could, upset it, and ate the surprised and helpless Indians who had been kneeling inside it and paddling.

After his meal, Turtle felt somewhat better. He sank to the bottom of the lake again, and suddenly realized that he had found a new and tasty food.

So the turtle watched, and every time he saw overhead the shadow of a passing canoe, he swam up, overturned it and ate the helpless Ojibway who were floundering in the water. This evil business went on for several days but, as you might expect, it was not long before Nanabush heard of the strange happenings that were taking the lives of so many of his friends.

"I like these Ojibway," he said. "They are very good to eat and, besides, they are Nanabush's friends, and this will be a good way to show him that he can't ignore me!"

"Turtle must be angry with me," Nanabush guessed to himself, "and he's taking his revenge by eating my friends. Well, I will soon put a stop to this, and make Turtle do something useful."

So Nanabush took his bow and quiver of arrows and dived down into the lake. He swam to the spot where he thought Turtle would be hiding. But Turtle, who had heard the splash and seen Nanabush, began to swim away from the mighty magician. Even though he swam as he had never swum before, Nanabush came closer and closer to him. In fright, Turtle swam up to the surface. Nanabush followed, and once his head and shoulders burst up into the air, he threaded an arrow into his bow, took aim, and sent the arrow singing on its way.

Turtle heard the arrow coming, and dived back down into the water quickly as he could. The arrow missed him but, in diving, the turtle had flung his tail high into the air, shooting a great spray of water into the sky.

Nanabush watched the spray go higher and higher into the sky. Suddenly, he broke into a laugh.

"You can go back down to the bottom of the lake, you silly Turtle," he exclaimed. "I believe I've taught you a lesson, and you'll think twice before you try to kill and eat any more innocent Ojibway. Whether you know it or not, you've done your duty. That spray you shot into the air I will turn into thousands of little stars, which will be easily seen, and which Indians will always find useful."

So, if you look up into the sky on a clear summer night, you will see what Nanabush meant. There is a broad pathway of stars in the sky, a pathway which we call the Milky Way, and which has helped th Indians keep their directions in their wanderings for many years than you can count. And furthermore [illegible] Ojibway storytellers will tell you, the Milky W[illegible]s a pathway for birds in Spring and Fall, giving them directions as they fly from north to south or back to the north. Thus it was that the sulky turtle, who had tried to do so much harm, in the end became a helpful turtle.

Source:

*David and Emerson Coatsworth, eds., *The Adventures of Nanabush*. Copyright 1979 by Doubleday Canada Ltd. Reproduced with the permission of Atheneum Publishers. (A Margaret K. McElderry Book), pp. 72-74.

How Paul Made The Thumb Of Michigan

Earl Clifton Beck*

Paul and me was sent over on the Huron shore to estimate some timber. Now it took us a heap sight longer than we had figgered. So we run out of fresh grub. Paul says, "Perry, let's go fishing." Says I, "Where is the tackle?" Well, he went back in the swamp and picked up an old swamp hook he'd seed. We picked up a steel cable on shore for a line; and Paul ketched a pig for bait. Then we built a raft and got on and throwed out our line. Nothing happened till it was most dark. Then we had the dangest strike, hooked onto something, and went sailing out into Lake Huron. All night we went speeding around the lake. Twice we seed the lights of Detroit. Come morning and he tired down and went to the bottom and sulked. We see we was pretty close to where we had started. Paul said, "Perry, you stay here on the raft in case this sturgeon starts sudden. I'll slip on shore and give this line a half hitch around a tree." Well, Paul got to shore all right and tied up that fish. Then I got to shore, and both Paul and me laid down to get some sleep. Those dang Huron Indians picked this spot for a war dance, and Paul and me was waked up with the yelling.Paul said, "Perry, that sturgeon is going to get scared." Just then that line begin to wiggle. And first thing we knowed that fish struck for the Canadian shore. He pulled that tree, soil, and everything right along with him. And ever since Michigan has had a Thumb.

Source:

*Earl Clifton Beck, *Lore of the Lumbercamps*, University of Michigan Press, Ann Arbor, Michigan, 1948, pp. 334-335. Used by permission.

Writing Home

Charles E. Brown*

It was so cold during one winter at one of Paul's camps that even the fire in the big camp range froze. When a lumberjack wanted to write a letter to his home, he just stepped outdoors and shouted the words he wished to write. These froze solid. He wrapped them up in a gunnysack and sent them home. When the sack arrived, all his folks had to do was to thaw them out in or on the kitchen stove, and they had the letter just as it was spoken.

Source:

*Charles E. Brown, "Writing Home," *Flapjacks from Paul Bunyan's Cook Shanty*, Pamphlet of Wisconsin Folklore Society, State Historical Society of Wisconsin, Madison, Wisconsin, 1941.

Activity 13: TV Documentary—Three Centuries Of Great Lakes History

If TV were invented a few centuries earlier, reporters might have interviewed the people making Great Lakes history. In this exercise students can play a reporter or a historical character to bring history to life.

Grades: 5-8
Subject Areas: History, Language Arts, Drama

Your students can make Great Lakes history come alive by portraying the men and women described in this activity. Whether their names are in all the history books, like Nicolet and Perry, or known only from a few clippings, like Queen Marinette and Captain Dave Beggs, the men and women who fought for, settled and worked in the Great Lakes tell revealing stories. By reading and re-enacting their stories, students can experience the feelings and reactions of their Great Lakes ancestors.

Procedure

1. To create a TV documentary assign roles using the attached profiles or supplementary reading. Some students will portray characters described in the attached profiles; others may prefer to search books for different characters. Each character will be interviewed by a student in the role of TV reporter. Several students should assume the reporter role.

2. Consult "For the Reporter" and "For the Character" on the next page to help the reporter and character confer on questions and responses. The interviews they create should reveal the character's place in history. Keep the interviews brief.

3. Help the students present their dialogues to the class. You might take the role of a general announcer and introduce the theme of the documentary which covers almost 300 years. "You are There" and "The March of Time" styles can be used. If video equipment is available the students may enjoy seeing themselves.

4. After presentation of the TV Documentary have your students write a short essay on one of the following topics:

- Compare and contrast any two characters presented.
- Why would you like to be any one of the characters?
- Why would you *not* like to be any one of the characters?
- List six things you have learned about the Great Lakes from one or more of the characters presented.
- What parts of the simulation accurately portray history?
- How could it be changed or improved?
- What are some things you learned from the simulation activity?
- Introduce two characters to each other. Report their conversation.

Taking It Further

1. Using one of the attached profiles, students might write a news story to appear in a contemporary newspaper (for example, a report in the "Sheboygan Times" on the *Phoenix* disaster).

2. Working in groups, students could dramatize one or more of the incidents described in the profiles. Backdrops and costumes would enhance the authenticity. If available, portable videotape equipment might be used to actually create a documentary to share with other classes.

For The Reporter

Begin each interview with a brief introduction of the person, the date and place of the interview. For example: "Dateline: Detroit, November, 1900. We are broadcasting live from a 180 foot (55 meter) wooden steamer, the *Aztec*. It has just arrived in port loaded with grain from Chicago. Today we will hear the strange tale of Captain Dave Beggs whose sailing skill and instinct averted a possible disaster." You can decide whether or not to reveal the end of the story at the beginning.

Remember, a reporter's responsibility is to answer the five "W" questions: "Who, what, when, where and why?" But don't stop with that. Ask questions to help your audience understand not only what the people did, but how they felt about doing it. Ask questions you think your audience might want to know. Here are a few examples:

- What's the worst thing that happened to you during . . .?
- How did you feel?
- Why did you . . .?
- What's the funniest thing that happened to you?
- Tell us what the lake and shoreland were like.
- What did you like best about what you were doing?

For The Character

Read the profile developed for your role. Look for more information in your school or community library. Develop a feeling for the person that you are acting. Use your imagination to fill in any gaps.

Characters included:

Jean Nicolet	- French Agent and Explorer (1634)
Fr. Jean de Brebeuf	- Jesuit Missionary (1635)
Madeline LaFramboise	- Fur Trader (1809)
Marinette Jacobs	- Fur Trader (1822-1865)
Oliver Hazard Perry	- Leader of the Battle of Lake Erie (1813)
Juliette Kinzie	- Early Wisconsin Settler and Author (1830)
Katrina Van der Zanden	- Survivor of the Phoenix (1847)
Hariette Colfax	- Lighthouse Keeper (1876)
Maebelle Mason	- 14-year-old who rescues drowning man (1890)
Captain Dave Beggs	- Captain of the Aztec (1900)

In addition to the characters included, other historic people should be interesting and reasonably easy for older students to find through reading or library research.

The books of Dana Thomas Bowen and Dwight Boyer are excellent and very readable sources of characters and incidents of the Great Lakes.

Jean Nicolet-French Agent and Explorer

Jean Nicolet came from France to New France (Quebec, Canada) in 1618. His job was to live among the Algonquin Indians to learn their language and customs because he was considered very smart and had a good memory. He shared their life and travels, often going without food as they did for a week at a time. As a respected leader, he helped make peace between the Algonquin and Iroquois tribes. For 11 years he lived like an Indian, making a family, joining their councils and fishing and trading for himself. Then he was called by his governor, Samuel de Champlain, to travel between tribes making peace and bringing messages and gifts.

In 1634 Nicolet became the first European to see Lake Michigan and the land of Wisconsin. He was sent by de Champlain to the Indian nation called 'People of the Sea' near what is now Green Bay, Wisconsin. He was to report on a great sea which they believed was salt water and to make peace between the friendly Huron Indians and the unknown 'People of the Sea.'

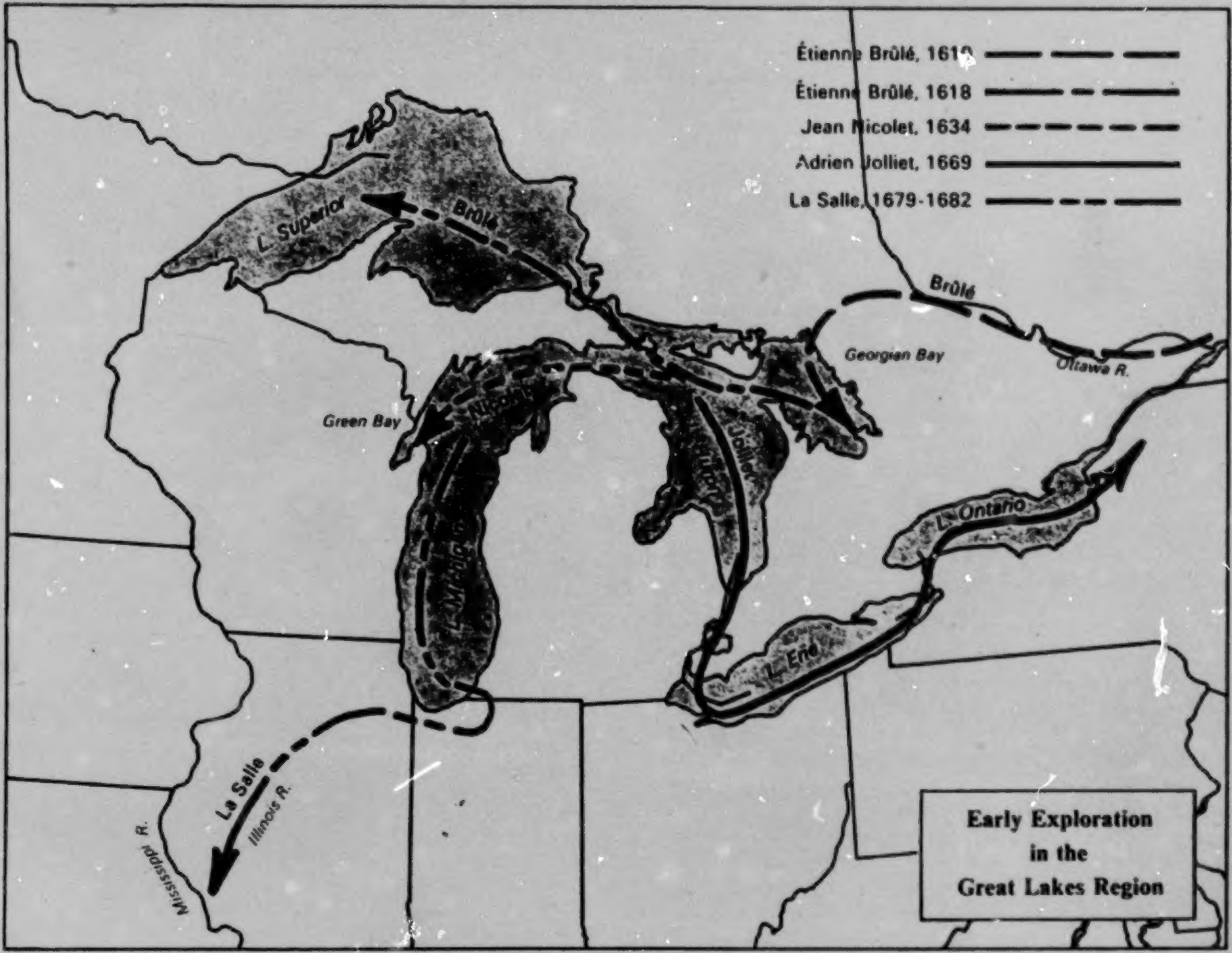
At his first meeting with the new Indians, believing them to be Chinese, Nicolet wore a colorful Oriental robe decorated with flowers and birds.

One of Nicolet's companions described his meeting with the People of the Sea: "When he was two days' journey from that nation [the People of the Sea], he sent one of the [Huron Indian companions] to bear tidings of the peace, which word was especially well-received when they heard that it was a European who carried the message. They dispatched [sent] several young men to meet the *Manitou-irin-i-ou*, that is to say, 'The wonderful man.' They meet him; they escort him, and carry all his baggage. He wore a grand robe of China damask, all strewn with flowers and birds of many colors.

"The news of his coming quickly spread to the places round about and at one of these banquets they served at least sixscore [120] beavers. The peace was concluded; he returned to the Hurons . . . He was equally and singularly loved [by both the French and the Indians]."*

Source:

*Reuben Gold Thwaites, *The Jesuit Relations and Allied Documents*, vol. xxiii, 1642-1643, Burrows Brothers Co., 1896-1901, Cleveland, pp. 275-283.


Étienne Brûlé, 1610
Étienne Brûlé, 1618
Jean Nicolet, 1634
Adrien Jolliet, 1669
La Salle, 1679-1682
L. Superior
Brûlé
Brûlé
Georgian Bay
Ottawa R.
Green Bay
Nicolet
Jolliet
L. Ontario
L. Erie
La Salle
Illinois R.
Mississippi R.

Early Exploration in the Great Lakes Region

Source:

William Donohue Ellis, *Land of the Inland Seas:* The Historic and Beautiful Great Lakes Country, American West Publishing Co., Palo Alto, California, 1974, p. 96. Used by permission.

Father Jean de Brebeuf—Jesuit Missionary to the Huron Indians

William Donohue Ellis*

The Jesuit priests were an elite group of highly educated, formerly wealthy and physically tough men who reported directly to the Pope. They explored the new world. Their reports were published every year or two in France as *The Jesuit Relations.* People read them eagerly. They were true adventure stories, full of suffering and triumph among the Indians.

One well-known missionary was Father Jean de Brebeuf. He was a very large, powerful and brave man. In 1635 he traveled with four other priests deep into the forest west of Ontario to work among the Huron Indians. He described his trip among the Hurons in *The Jesuit Relations:*

"I have kept count of the number of portages and found that we carried our canoes thirty-five times and dragged them at least fifty. I took a hand in helping the [Indians]; but the bottom of the river is full of stones so sharp I could not walk them barefooted, though the Indians do. In regard to provisions, frequently one has to fast, if he misses the caches [hidden supplies of food] that were made [when the Indians came down from Huron lands to Quebec]." Even if caches are found, he warned that Frenchmen would go hungry, "for the ordinary food is only a little Indian corn coarsely broken between stones and taken whole in pure water."

Although Brebeuf was a strong man, he was not accustomed to the dawn-to-dusk paddling. His relationship with the Indians was strange and constantly changing. While at certain times the Indians were in awe of the Jesuit, at other times the Jesuit was their slave and subject to contempt and physical abuse. At the portages, Brebeuf wrote, the Indians would hurry off at a run with their own baggage leaving him to carry his own or be left behind.**

Brebeuf set down instructions for traveling with Indians: "You must be prompt in embarking and disembarking. Tuck up your gowns so they will not get wet, and so you will not carry either water or sand into the canoe . . . you must have your feet and legs bare; while crossing the rapids you can wear your shoes and in the long portages even your leggings. Be careful not to annoy anyone in the canoe with your hat."

Source:

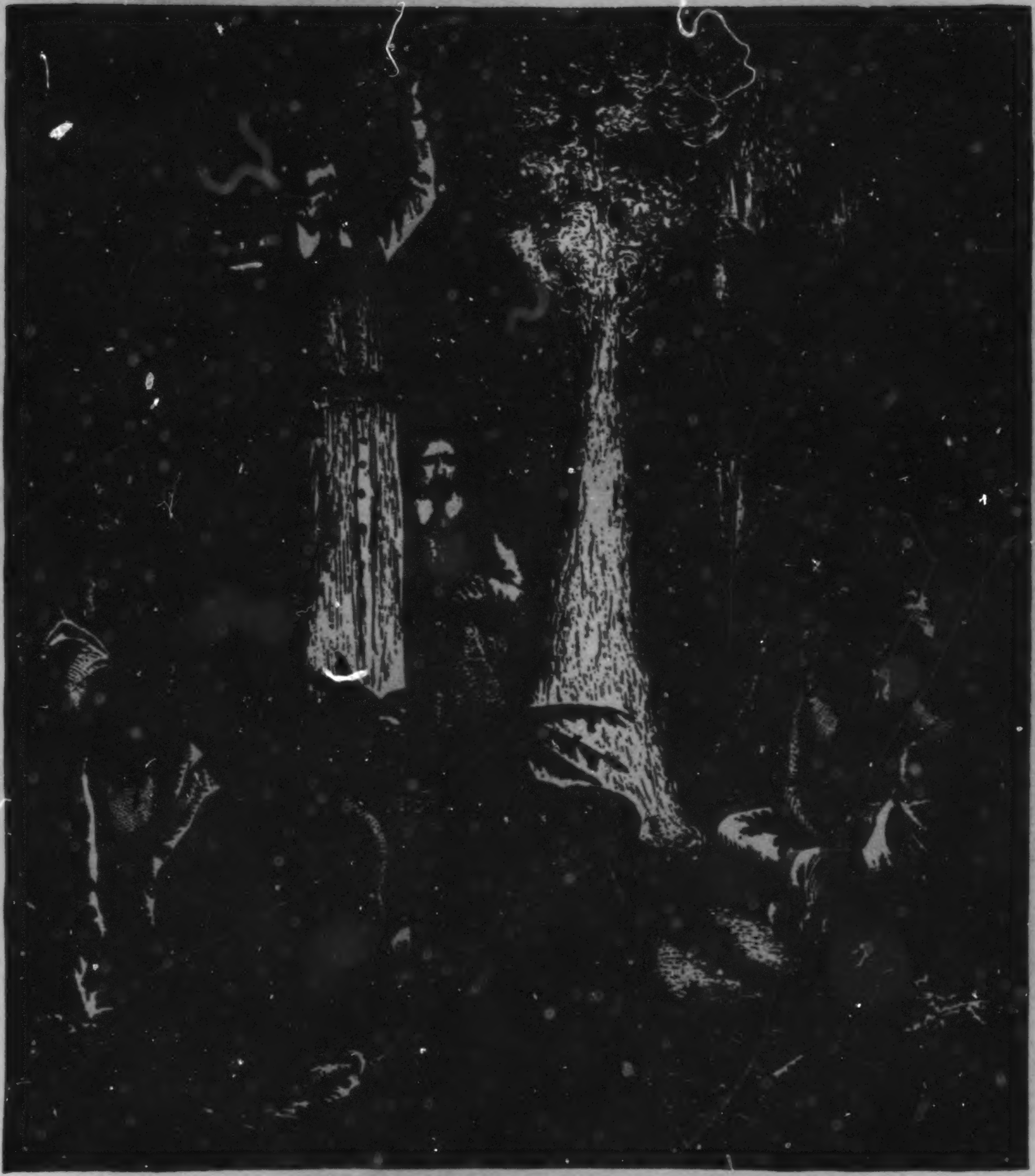
*William Donohue Ellis, *Land of the Inland Seas: The Historic and Beautiful Great Lakes Country,* American West Publishing Co., Palo Alto, California, 1974. (Adapted and quoted by permission from pp. 101, 103, 105.)

****To Student:**

Brebeuf was once a noble man accustomed to having servants. Do you think this may have affected the way he thought about the actions of the Indians?

Additional Character(s):

Invent the thoughts and feelings of one or two Huron Indians paddling Brebeuf. Let us know why you run quickly at portages: what you think of his clothes and manners: why his hat annoys you.



JESUIT MISSIONARIES AMONG THE INDIANS.
Drawn by Wm. L. Shepard.

Bettmann Archive. Used by permission.

Madeline La Framboise-Fur Trader

Madeline La Framboise was an Ottawa Indian, daughter of a member of the Courtes Oreilles band and a Frenchwoman. In 1796 she married a French trader for the American Fur Company, Joseph La Framboise. His job was to trade for furs with the Indians in western Michigan.

Through the years Madeline and their children accompanied Joseph on his summer trading rounds, living in Mackinaw in the winters.

The fur companies competed actively with each other for the furs supplied by the Indians. They used whatever tricks they could to win, including illegal and immoral ones. By British rule traders were not supposed to supply Indians with alcohol. Indians were not used to alcohol and it caused many problems for them. Joseph La Framboise, however, knew that more Indians would trade with him if he broke the rule. His decision changed Madeline's life.

Here is how one historical account describes the way Madeline La Framboise became a fur trader on her own:

> In 1809, in coming from Mackinaw, they met on the Lake shore about half way between Muskegon and Grand Haven a party of Potawatomies, among whom was a young brave who, after they had gone into camp, demanded whisky from Joseph La Framboise. It was refused. The Indian drew a knife and drove it into La Framboise's breast. The white man immediately expired [died] and the Indian fled. Mrs. La Framboise took the remains of her husband in a bateau [type of boat] to the trading post where they were buried, and she continued the trade with Indians of the Valley. Before her return to Mackinaw in the autumn, a band of Potawatomies brought to her the murderer and offered him to the widow for execution in conformity with Indian usage [customs]. She did not demand life for a life, but requested that he be set free, yet forever banished from the tribe. It was done and the Indian became an outcast.
>
> At the end of the season she returned to Mackinaw with the remains of her husband, which were reburied on the Island. So successful had been Madame La Framboise in the Indian trade that she was continued as an agent for the company in place of her husband.* [Unfortunately she continued his practice of selling liquor too.]

Hint: To the reporter: Ask Madame La Framboise why she breaks the law and trades liquor with the Indians. Ask her if being a female makes her a more successful trader. Does being a woman protect her from the fate that befell her husband?

Sources:

*Charles Langlade, "The Indians of the Grand River Valley,"Michigan Pioneer and Historical Collections, Vol. XXX, Michigan Pioneer & Historical Society, Lansing, Michigan, 1905, pp. 176-177. Used by permission.

David Lavender, *The Fist in the Wilderness,* Doubleday and Co, Inc., Garden City, N.Y., 1964, p. 264.

Marinette Jacobs—Fur Trader

Another woman fur trader was Marinette Jacobs, for whom the city of Marinette, Wisconsin was named. Known as "Queen Marinette," she settled in 1822 in the Menominee River area near Green Bay, Wisconsin. Marinette was an Ojibway [Chippewa] Indian. Her close ties with Ojibway in the area were valuable in the fur trade.

She and her husband William Farnsworth built a small sawmill on the Menominee River. While Farnsworth worked at the mill, Marinette handled the business of the trading post where she "acquired an outstanding reputation for commercial ability,"* according to a pamphlet on Wisconsin history. The mill failed and Farnsworth travelled to other towns looking for work while Marinette ran their fur trading business.

"Queen Marinette's home not only was the center of early trading on the Menominee River but also a social center for the isolated settlement. Many socials were held there with Indians and Whites sharing the fun of dancing or listening to fiddle music . . . Marinette also set out the area's first apple orchard and was known for her generosity to the needy.

"Her business skill and popularity advanced with her years and Senator Isaac Stephenson (who later became governor of Wisconsin) recalled in his memoirs that she managed her affairs with exceptionally good judgement."*

Marinette died in 1865 at the age of 72.

Source:

*"Come to the Land of Queen Marinette." Pamphlet, 16 pp. (State Historical Society of Wisconsin catalog number PAM 76-2811.)

Commodore Oliver Hazard Perry—Leader of the Battle of Lake Erie

William Donohue Ellis*

At the beginning of the War of 1812 between Britain and the new country of the United States, the British controlled Lake Erie. They had forts with soldiers stationed strategically throughout the Great Lakes at Mackinac, Chicago, Niagara, Detroit, Oswego and Presque Isle. The treaty ending the Revolution nearly 30 years before had said the British would leave these posts, but they had not done so.

The British also had the help of Indians in the Northwest Territory who had formed a powerful alliance under Chief Tecumseh. (Tecumseh was described by his enemy, General William Henry Harrison, as the superior of any American general in the history of the country). They were unified by belief in the spiritual powers of Tecumseh's brother who had commanded the sun to go dark. (He apparently learned in advance of a total solar eclipse). Since the Indians were being systematically hunted and swindled by settlers to the Northwest Territory, they allied themselves with the British in an effort to force out the Americans.

The Americans and British battled back and forth. It was clear that the Americans had to take control of Lake Erie if they were to push the British out and attack their positions in Canada.

In a truimph of shipbuilding, the Americans built a fleet at Erie, Pennsylvania. On March 27, 1913, the future commander of the fleet arrived —Oliver Hazard Perry. Perry was only 28, but a veteran.

By two in the afternoon of September 10, 1813, this new nine ship fleet was receiving a terrible pounding from six British warships on western Lake Erie. Commodore Perry's flagship *Lawrence* was a crippled wreck of smashed rigging cluttering a bloody deck. Only 16 of 130 men left in action and all guns were silent. The British Navy were at the moment only minutes away from total control of Lake Erie. Suddenly Perry ordered a boat lowered with 8 oarsmen to transfer him to the *Niagara*. As the small boat leaped away from the ship it came under fire but Perry successfully boarded the *Niagara* and took command. His quick eye found the rigging undamaged, guns undamaged and crew intact except for three casuaiities.

At 2:45 Perry ran up his pennant on the *Niagara* and cut out of line [the ships faced each other firing their guns in two long lines], heading due north under full press [all sails flying], aiming to cut right through the British line between the *Detroit* and the *Hunter*, broadsiding [shooting his guns into their sides rather than facing their narrow bows] both at very close range.

British Capt. Robert Barclay's *Detroit*, attempting to swing to broadside the *Niagara* as she cut through, fouled with the *Lady Prevost*. Perry dashed between the *Detroit* and the *Hunter*, firing out of both sides at point-blank range. His longer range guns even raked the *Queen Charlotte* and the *Lady Prevost*. In this single blazing pass, Perry seriously damaged four British vessels, wounding Captain Barclay.

Three ships were badly damaged: The *Detroit*, *Lady Prevost* and *Hunter*, and they surrendered. Two others escaped. When the smoke cleared Perry sent his famous message to Brigadier General Harrison who was waiting at Fort Meigs to invade Canada: "We have met the enemy and they are ours; two ships, two brigs, one schooner, and one sloop."

British control of Lake Erie was broken and Harrison could now invade Canada.

Source:

*William Donohue Ellis, *Land of the Inland Seas: The Historic and Beautiful Great Lakes Country*, American West Publishing Co., Palo Alto, California, 1974, p. 154. (Adapted by permission.)

Juliette Kinzie-Early Wisconsin Settler and Author

One rainy evening in September, 1830, Juliette Kinzie boarded the steamer *Henry Clay* in Detroit. She was to travel with her husband John up through Lake Huron to Mackinac Island, then south through Lake Michigan to Green Bay. John Kinzie was to become an Indian Agent at Fort Winnebago, Wisconsin.

Juliette Kinzie's good humor and adventurous spirit are obvious from her writings. When she left for Fort Winnebago she was a well-educated and wealthy woman of 26. From the time she was a child in the settled Eastern town of Fishkill, New York, she had dreamed of the romance and adventure of the "Indian country" (Michigan and Wisconsin). In her autobiography, *Wau Bun*, she writes: "That distant land with its vast lakes, its boundless prairies and its mighty forests, had possessed a wonderful charm for my imagination."*

The first day on the steamboat *Henry Clay* was pleasant. The passengers read books and admired the scenery. The second night a storm came up. The little boat pitched and rolled. Everybody was seasick. Soon the rain began to run through the holes in the deck into the cabin. Everyone and everything was soaked.

Some people put up umbrellas inside the cabin to keep some of the water off them. Juliette and others crawled into the berths [beds] and huddled under blankets, while the storm went on for the whole next day. At nine o'clock that night they arrived at Mackinac Island.

The next day was clear and sunny and Juliette toured the island, meeting Indians and Canadian *engages* [workers]. She visited the five families who ran the American Fur Company trading post headquarters. That night she and her husband left on the steamer again and rode through storms on Lake Michigan for two more days till they reached Green Bay, Wisconsin.

Here is how she describes Mackinac Island and Lake Michigan in *Wau-Bun*, her autobiography:

> The rain had passed away, but had left all things glittering in the light of the sun as it rose up over the waters of Lake Huron, far away to the east. Before us was the lovely bay, scarcely yet tranquil after the storm, but dotted with canoes and the boats of the fishermen already getting out their nets for the trout and whitefish, those treasures of the deep. Along the beach were scattered the wigwams or lodges of the Ottawas who had come to the island to trade. The inmates came forth to gaze upon us. A shout of welcome was sent forth, as they recognized "Shaw-nee-aw-kee," ["Silver Man"—a family name given by the Indians to John Kinzie's father because he made silver jewelry for them].
>
> A finer sight can scarcely be imagined than Mackinac, from the water. As we steamed away from the shore, the view came full upon us—the sloping beach with scattered wigwams and canoes drawn up here and there— the irregular, quaint-looking houses—the white walls of the fort, and, beyond, one eminence [hill] still more lofty [higher] crowned with the remains of old Fort Holmes. The whole picture completed, showed the perfect outline that had given the island its original Indian name, *Mich-i-li-mack-i-nack*, the Big Turtle.
>
> Then those pure, living waters, in whose depths the fish might be seen sliding and darting to and fro, whose clearness is such that an object dropped to the bottom may be discerned [seen] at the depth of fifty or sixty feet, a dollar lying far down on its green bed, looking no larger than a half dime.*

Source:

*Juliette Kinzie, *Wau-Bun, The Early Day in the Northwest*, George Banta Pub. Co., Menasha, WI, orig. pub. 1856, reprinted 1930, pp. vii-xxii, 1-13.

Katrina Van der Zanden-Survivor of the Phoenix

"Fire!" The shouts woke Katrina from her restless sleep on the deck of the *Phoenix*. Bundling her tiny baby against the frigid November wind, Katrina shook her daughter Beatrix awake roughly. Terrified, Katrina watched her neighbors and friends jump awake and begin to fill and pass buckets to put out the fire.

Katrina was lucky. She had been sleeping near one of the two small lifeboats. Dragging Beatrix and the baby she pushed her way into one of the boats. Surely her Dutch friends will be saved she thought. Sheboygan, Wisconsin is only 5 miles [8 Km] away. They can't miss seeing the flames leaping high into the air. They will send lifeboats.

Katrina lived in a small village in Holland. Letters from friends, posters and flyers from ships, gossip among the neighbors all praised the new country of Wisconsin and Michigan. Katrina's husband, a woodworker, had sailed for the new world a year ago. His enthusiastic letters home talked about the great abundance of timber. They soon included enough money for Katrina and her two daughters to sail to America. With a dozen neighbors from her village, Katrina said good-bye to her mother and brother and joined a group of nearly 300 Holland Dutch going to settle in Wisconsin.

After days of waiting in New York for permission to enter the United States, Katrina and her group traveled a week on the Erie Canal, then rested in Buffalo while their leader found passage on a lakes steamer. It was their bad luck that they found space among the barrels of coffee, sugar and molasses on the *Phoenix*.

Floating in a leaky boat, water up to her ankles, Katrina tried to calm her screaming baby and held her terrified 7-year-old daughter close to her. One person bailed with a wooden shoe while another tried to move the lifeboat toward shore with its only oar. By the light of the flames she could see people on the *Phoenix* throwing doors, furniture and ladders into the water. They must have been hoping they could jump into the water and hold on till rescue came. But the November waters were so cold that they very quickly lost consciousness, slipped under the water and drowned.

When the lifeboat was finally washed to shore, people from Sheboygan made fires on the beach to warm the survivors. Later they were taken in by Sheboygan families. Churches and other groups made collections to provide the survivors with clothing, furniture and money to get started in their new homes.

Katrina is an imaginary person, but the story of the *Phoenix* and the immigrants is a real one. More than two hundred people drowned within five miles of their new home, after traveling thousands of miles across the ocean from Holland. Only 43 people were saved when *The Phoenix* sank on November 21, 1847.

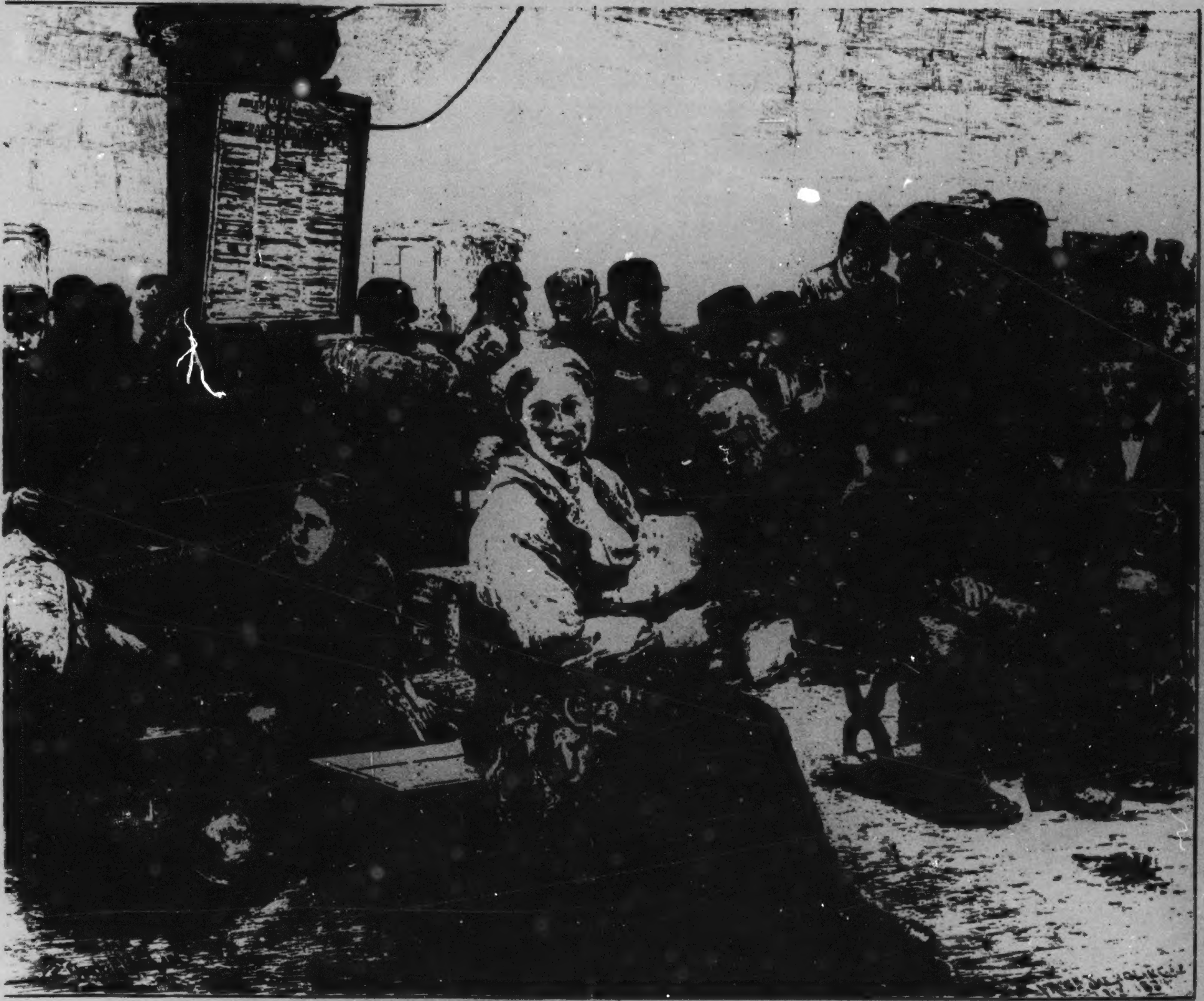
To the Student:

1. Change the ending of the story so one or both of Katrina's children drown. Write a scene where Katrina and her husband meet.

2. Change the story so Katrina and the baby are lost. Tell the story through the eyes of 7-year-old Beatrix.

Source:

Doris Platt, "The Tragedy of the Phoenix," *Badger History, Dutch in Wisconsin.* vol. xxxii, no. 4, Ed. Howard Kanetzke, State Historical Society of Wisconsin, Madison, Wisconsin, March 1979, p. 37.



By Charles R. Ulrich. Bettmann Archive. Used by permission.

Harriet Colfax—Lighthouse Keeper

Putting a "light in the window" to guide and welcome a night traveler is probably as old as humanity. When it came to guiding ships on the lakes, navigational lights were a matter of life and death.

Lighthouses along the lakes began to appear as soon as sailing vessels replaced canoes. They were powered by animal fat oils and needed careful tending. Their small lights were magnified by glass prisms imported from France.

In the 1850's as lake transportation boomed because of the copper and iron discoveries in Northern Michigan, the U.S. Government created the Lighthouse Service. It built new buildings with taller lights and paid the wages of keepers to tend them.

For more than forty years, from 1861 to 1904, Harriet Colfax kept the lighthouse at Michigan City, Indiana. Each night she would melt lard to make oil, light a small lantern, and fill and light the beacons on top of the lighthouse and at the end of the breakwater. The light could be seen 15 miles out on the lake—signalling safe harbor to incoming ships.

Here is an account of one night's struggle to light the beacons, as reported in the local newspapers in 1876:

> It was a cold, windy night as the tiny woman started out on her nightly chores to light the beacon atop the Michigan City Lighthouse and to ignite a second beacon at the end of the harbor's breakwater.
>
> The wind blew icy waves over the slippery and dangerous walkway leading to that outer beacon. But Miss Harriet E. Colfax, keeper of the Michigan City Lighthouse, knew that a lighted beacon could mean the difference between life or death to sailors attempting to reach port in that turbulent Lake Michigan weather.
>
> Twice she was driven back by the icy waves. When at last she reached the beacon, she found that someone had tampered with the lock and it refused to open. She finally broke a pane of glass, and crawling through the aperture [opening] inserted the lamp in its customary place.
>
> By that time, however, the lard oil used to feed the light had congealed [become solid] and the beacon would not ignite.
>
> But the beacon had to be lighted. Lamp in hand, Miss Colfax started back to the lighthouse over the ice- covered walkway. She slipped, fell, rose and slipped again, but at length she reached the lighthouse.
>
> The oil was reheated and again she started out for the beacon, this time accomplishing her task, but returning with a bruised and thoroughly soaked body.*

Harriet Colfax lived at the lighthouse for 43 years with a school teacher friend, Ann Hartwell, who also gave piano lessons. Harriet retired in 1904 when the lighthouse was remodeled and a new beacon built on the Michigan City, Indiana, pier.

Source:

*Edna Kitchell, "Harriet Colfax, Keeper of City's Old Lighthouse," *News-Dispatch,* Michigan City, Indiana, Oct. 22, 1966. Used by permission of *News-Dispatch.*

113

Maebelle Mason-Young Hero

Dana Thomas Bowen*

Another hero who lived in a lighthouse was Maebelle Mason, daughter of the lighthouse keeper at Mamajuda Island Light in the Lower Detroit River.

Maebelle was 14 years old on the morning of May 11th, 1890, when she became a hero. Her father went to the mainland for supplies leaving Maebelle and her mother alone at the lighthouse with only a small flat-bottomed skiff [rowboat] for transportation.

When a big freighter, the *C. W. Elphicke* bound for Lake Erie, passed close to the light, the captain shouted that a man was struggling with a capsized rowboat about a mile upstream. It was impossible for the freighter to stop to rescue him.

Maebelle and her mother dragged their only boat into the water. The strong current was bringing the sinking row boat and the desperate man nearer the light. Maebelle knew that if he swirled past her she would likely never be able to catch him. It was then or never. The man's life hung in the balance.

The girl pulled with all her might on the skiff's oars. She intercepted the fast-drifting wreck almost abreast of the lighthouse. It was both difficult and dangerous to haul the almost unconscious man into her little boat, but she tugged at his clothing and somehow managed to get him safely into her skiff. She headed back for the light and after a hard row landed the skiff with its half-drowned occupant on the little beach. She and her mother revived the exhausted man and he soon recovered.

Maebelle was recognized for her heroism in newspapers and magazines and was awarded a United States Life Saving Medal at a celebration in Detroit.

Source:

*Dana Thomas Bowen, *Memories of the Lakes*, Freshwater Press, Cleveland, Ohio, 1983, pp. 167-68. (Adapted and quoted by permission.)

Dave Beggs—Captain of the Aztec

Dwight Boyer*

Guiding a boat through the Great Lakes is no easy task. Sudden storms can beat up 20-30 foot [6-9 meter] waves. Shoals, shallow places in the lakes, lurk beneath the water to tear out the bottom of ships that stray from their courses. Fog, rain and snow can make even the bow of your own ship invisible.

In the days before radio, satellite weather reports and radar, a ship was completely isolated. The safety of the crew, the cargo and the boat itself depended on the skill and experience of the captain. A compass, a clock, and a chart in the boat, and occasional lighthouses or lightships along the shore helped the captain find the way. In darkness these markers beamed light signals to warn ships of approaching points of land or narrow channels. In fog, they blared out a horn blast every few seconds.

Captain Dave Beggs was the skipper of the 180 foot wooden steamer *Aztec.* One day around 1900 he left Chicago for Montreal with a cargo of grain. Shortly after they left port a fog set in, so dense you couldn't see beyond the bow. All the way up Lake Michigan and through the dreaded Greys Reef passage, Captain Beggs piloted the *Aztec* by dead reckoning. He had just three tools: the clock to tell him how long he had been steaming on a specific course, the "taffrail log" to record the distance traveled, and regular measurements of the water's depth taken by the mate.

At the Straits of Mackinac, the wreck-strewn bottleneck passage between Lake Michigan and Lake Huron, the *Aztec* was still in a fog as thick as cotton. Through the open pilot-house windows he could hear the mournful hooting of a half-dozen other vessels. Some of them were in the distance, others fearfully close. It was Captain Beggs' responsibility to decide [the locations and courses of the other ships]. He had only his experience and his instinct to go by in the deep fog. Somehow [the *Aztec*] made it through the straits and began the long trip down Lake Huron.

Through long, sleepless hours of the night Captain Beggs stared at the clock, recorded the taffrail log readings and compared his depth charts with the mate's reports. According to his calculations, the *Aztec* should be close to where Lake Huron ends in the swift and narrow St. Clair River. But something important was missing! There was no welcome sound from the Lake Huron lightship fog whistle. It had to be there, a couple miles ahead of where the river narrows. But there was no sound of it! Unknown to Captain Beggs, the signal whistle was broken. The workers on the lightship were frantically trying to repair a broken valve.

Captain Beggs lowered his ship's speed down to 'dead slow,' inching through the water, searching for the critical marker ship and its warning horn. Another measurement by the mate of the lake's depth convinced him that he was exactly where he thought he should be. Still no sobbing of the whistle from the lightship!

Suddenly, it had to be an instinct that told Captain Beggs to go no further. He ordered the engines stopped and dropped the anchors. The *Aztec* lay motionless on the flat, fog-shrouded water.

A short while later, a sudden breeze blew the fog away, and everyone's heart stopped for a moment with what they saw. The end of a 20-foot pole sticking out of the bow of the *Aztec* was stuck in the lines and rigging of the fatefully silent lightship. They had missed ramming her by 20 feet! Their safety was due to Captain Beggs' and his skill with the charts.

Source:

*Dwight Boyer, *Strange Adventures of the Great Lakes,* Dodd, Mead and Company, N.Y., 1974, pp. 225-228. Used by permission.

To the Student: Today shipping rules tell captains to stop and anchor if there is deep fog while they are in the St. Marys or St. Claire River. What do you think about Captain Beggs' decision to keep going?

Vocabulary:

Chart: Map of the lake showing waterdepths (see example in Activity 18 "Chart Your Course".)

Lightship: Old sailing ships no longer used for cargo on the lakes were sometimes "retired" to service as a lightship. Fitted with a beacon light and a foghorn, they were anchored along a shipping lane to warn of shoals and narrows.

Taffrail Log: A brass, torpedo-like instrument attached to a dial on the ship's deck. It is lowered into the water by somebody standing at the rail at the stern of the ship. The water makes a small propeller on the instrument turn. The faster it turns, the higher the ship's speed. The speed is read from the dial.

Activity 14: Immigrants Write Letters Home

Letters by two Norwegian immigrants give students a feeling for two sides of the issue of emigration as well as ideas for their own letters "home." This exercise of the imagination can be made more real by inviting a foreign-born person to visit your classroom. (You may wish to pair this lesson with Activity 8, "Ojibway-Early Immigrants to the Great Lakes Region" or Activity 13, "TV Documentary—Three Centuries of Great Lakes History.")

Grades: 6-8
Subject Areas: History, Language Arts

The most massive migration of human beings in history took place in the 19th century as Europeans moved into the western Great Lakes states and Canada. Before railroads were completed in the 1860's, many came to ports like Milwaukee, Chicago and Detroit by barges through canals and then by lake steamers. Their history, skills and values helped shape the culture and identity of the Great Lakes Region.

Many immigrants (people moving *to* an area) came because of the jobs available building railroads and canals or working in lumbering and mining industries. Some companies sent recruiters to European countries. They promised jobs and loaned passage money to people willing to come to the U.S. The Lake Superior Copper Mining Company sent a representative to Sweden in 1864 to enlist 10,000 miners. Some states wrote enticing (and sometimes inaccurate) brochures about the joys and opportunities of farming within their borders, then distributed them around the countries of Europe. Many immigrants came because they sought freedom of economic opportunity and religious, social and political freedom.

The arrival dates of the largest groups of immigrants coincide with major events in European countries such as the potato crop failures in Ireland in 1818 and 1845. The 1830's was a period of cold summers and poor crops throughout northern Europe and prompted the emigration (going *out* of an area) of many people. Unsuccessful revolutions in Germany in 1830 and 1848 led directly to the departure of many supporters of the rebellions who expected or experienced retribution.

The huge numbers of people moving into the Middle West are difficult to appreciate. In one example the population of Milwaukee, a destination port for only *some* of the Great Lakes passenger steamers, more than doubled in one year, from 21,000 in 1850 to 46,000 in 1851. Over one-fifth of the population of Norway and Sweden came to America in the 22 years between 1877 and 1898.

It is easy to understand that emigration (leaving the country) was a hot topic of conversation. Almost everybody had a cousin, brother, parent or child who had gone to the U.S., was planning to go or, in some cases, had gone and returned. Emigration was discussed in newspapers and debated in homes and political gatherings throughout Europe.

The two letters home to Norway which are part of this activity describe opposite perspectives on the question of emigration. They provide fascinating insights into the lives of the people and also into the art of persuasion. These letters probably were written with the knowledge that they would be published in the hometown newspaper (as they were). This accounts for their careful, lucid arguments, correct grammar and relative lack of personal information.

Procedure

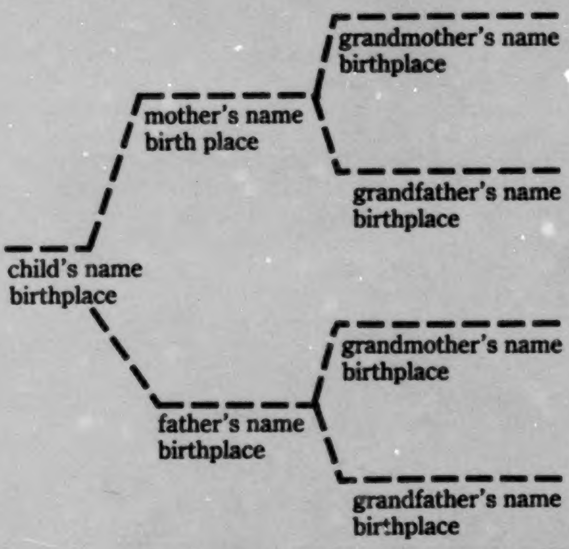
1. Have students read the two letters home to Norway and answer the following questions:

- What does Ole say about sickness? What does Jon say?
- What does Ole say about wages? What does Jon say?
- What does each say about work? What do you think of Jon's complaint about working conditions?
- What does each say about the weather and climate?
- What does each say about crops and cropland?
- About taxes?
- What exaggerated statement does Ole use to prove his position that immigration is good? ("Every poor person who will work diligently and faithfully can become a well-to-do man here in a short time")
- What exaggerated statement does Jon use to prove his position that no one should immigrate? ("America will always be unhealthful and no Norseman is ever going to be happy here." This is one of several statements.)
- Discuss what type of person Ole seems to be? What type of person does Jon appear to be?

2. Assign students to write a letter to an imaginary homeland in another country. They can talk about their present day community using the same elements which appear in the letters to Norway: health, wages, work, weather and climate, land, taxes. What other elements might they add that are not covered in these letters?

Taking It Further

1. Assign students to discover where their families came from. You might provide them with a simplified family tree worksheet which their parents can help them complete. Take a class survey and mark a world map with the families' "original" homelands.



2. Both letters included in this activity are from adults. Have your students imagine that they are pioneers. Ask them to write a letter home to their friends from their perspective as children.

3. Immigrants are not just people who came to the U.S. in the 1800's. Every year more than 500,000 people move to this country to live permanently. If you know of someone in your community who was born in another country, perhaps that person would like to visit your class and share information about his/her native culture, and the experience of living in a new culture. Ask your visitor to talk about the kinds of things she or he might say in a letter home to compare and contrast the two cultures. To prepare your students follow these suggestions:

A. Familiarize students with the home of your proposed guest through map and social studies readings.

B. Explain that the guest's home country has a history of its own. Discuss how we know about the past. Before history is written down in books, where does it come from? How do students know the history of their family and their younger years? Do they have favorite stories they like to tell? Are there stories their parents or siblings tell that they'd rather forget? Do they think their guest will have such stories?

C. Work with your students to practice oral history and interviewing each other as they would their guest. They should have a focus for the interview (for example: "Find out some things about your classmate that are different from you") and develop a list of questions designed to elicit information and anecdotes. Tape recording the interview may be interesting.

D. Before the visitor comes to the classroom you and your students should prepare a focus and some questions for the guest to answer. Share the list of questions with the guest before she or he arrives.

E. Thank the visitor in person and with letters. Ask the students to include at least one sentence on what was the most interesting thing they learned from their foreign visitor.

4. Throughout the year invite family members of your students to share their family history through old letters, photographs or books.

5. For letters from women immigrants consult Charlotte Erickson's book *Invisible Immigrants*. Letters from women are found on pp. 179-188, 207-208, 209-217. Discuss the roles and activities of women in this period. What do students know about women's role in history during this period? Do they think their knowledge is accurate? Do they think there might be things women did which they don't know about? Why? Who writes history? For what purposes?

Resources:

Books

Archer, Marion, *Sarah Jane*, Albert Whitman and Co.,Chicago, 1972.

Ellis, William Donohue, *Land of the Inland Seas: The Historic and Beautiful Great Lakes Country*, American West Publishing Company, Palo Alto, California, 1974, Chapter 14, "The Waves of Europeans: Immigrants who traded crop failure and revolution in the Old Country for dreams of a better life in the New.", pp. 179-185.

Erickson, Charlotte, *Invisible Immigrants: The Adaptation of English and Scottish Immigrants in 19th Century America*, University of Miami Press, Coral Gables, Florida, 1972.

Freedman, Russell, *Immigrant Kids*, E.P. Dutton, N.Y., 1980.

Weitzman, David, *My Backyard History Book*, The Brown Paper School Series, Little, Brown and Co., Boston, 1975.

Wilder, Laura Ingalls, *Little House in the Big Woods*, Harper and Row, N.Y., 1953.

Periodical

Cobblestone Magazine, December, 1982, and January, 1983 (two issues devoted to the immigrant experience).

Two Letters Home To Norway

From Ole Knudsen Trovatten, at Vernon, Wisconsin, to Tollef Olsen Juve*

June 28, 1842

You my true friend, probably censure [criticize] me for my emigration, and believe that I regret having left Norway. No! Not so. In no circumstances would I return to live in Norway, not even if I could be the owner of half of the Annex. Odefjeld is such a wretched place that one ought by no means to live there. Here in America a much better mode of living is open to every honorable citizen.

Every poor person who will work diligently and faithfully can become a well-to-do man here in a short time. You make take as an example myself, whose fortunes seemed from the beginning to be bad, for all my money — $28 in silver — was stolen from me nearly at the beginning of my journey in America at Albany. I was able to ward off starvation from myself and my family only with great difficulty.

Finally, after a fashion, I was given enough help to reach my destination in Wisconsin. I have now been in Wisconsin about a year and a half. During the past winter my wife and I and our oldest child were taken sick with malaria,** which attacks almost everyone, both natives and foreigners, but is not fatal. Still with me it lasted almost all winter.

Despite the fact that I came here empty-handed and have also been sick, I have nevertheless acquired the following property: one cow, a year-old pig, one calf, two two-year- old oxen (which are necessary for everyone for work), and forty acres of land, though I owe eighteen days of work on this land.

This will show what advantages there are for everyone who can work to come here. Though I have been sick almost half a year and have a family to take care of, still I have achieved much more than a worker can in Norway.

My wages per month are from $16 to $18 and board. I have been working for the same men all the time. When I was sick they did much more for me than my neighbors from my own country.

I have never lived better than at present. The only thing that I am dissatisfied with is that most of the groups here have no religion. They do not observe the Sabbath, a practice in which some of my countrymen follow their example.

The common monthly wage here is from $12 to $18 but some people, who are lazy, must be contented with $7, $8, or $10 a month. Servants get from $1.00 to $1.50 a week. Money is scarce here at present, so that some farmers do not pay their laborers.

Almost all conceivable [imaginable] useful things grow here with the greatest luxuriance, but the crops are greatly different and they are not all equally good. This year the crop promises to be very small, for it happened to be so exceptionally cold here the night between June 10 and 11 that much of the seed froze and some replanting was necessary. This was so unusual that no native had ever seen it before.

I find no difference between the climate here and in Norway. To be sure, some days in the summer are warmer here—but the warmth is not excessive. On the other hand I have experienced winter cold as severe here as in Odefjeld— but it seldom lasts longer at a time than one or two days.

Every man has a large number of pigs and also chickens. There are some here who have as many as a thousand chickens. The piece of land I have bought is as thickly covered with maple trees as the densest woods in Odefjeld, so I have the opportunity of tapping as much maple sugar as I please.

**possibly typhoid fever, not malaria

From Jon N. Bjorndalen, In Milwaukee County, Wisconsin Territory, to his parents*

January 5, 1844

I think of my countrymen with tender feelings and remember how they imagine that as soon as they get to America, great glories will open up to them. And how could they believe otherwise, for almost all reports and letters received in Norway from America were good. But this is very wrong; only about a third of these letters is true. People only write down accounts of the good, although they themselves have had no experience of it.

The first thing we encountered on our arrival in Milwaukee was two of our countrymen down at the wharf. Not until then did we see the good things one acquires in this country—an emaciated body and a sallow face! The ague** and other pestilential fevers were widespread so that one victim could not help the other.

The heavy air is depressing, and people walk around bowed like slaves weighed down by their chains and deprived of their freedom. In the summer the climate is far too hot; during the daytime the heat is so severe that when you work sweat pours out all over your body, as if you had been drenched by rain, and during the night everything is covered by poisonous fog.

There are a lot of snakes here, five or six different kinds, most of which are unfamiliar to me. They even get into the houses. The biggest I have seen are thick as a man's arm. In the short time I have been here I have killed many of them.

The land the Norwegians have settled consists mostly of woods and swamps, of which there are a countless number. It would be difficult to clear this land because of the big knolls (hills) and the roots the bushes put out, and the oak trees are as heavy to clear away as stones.

You have probably heard how light the taxes are said to be here; and it is true enough that the first two or three years the tax on eighty acres of land is only $1. But later a man goes around and puts a tax on your land, on what you have fenced in, on the land you have cleared; if you have built a house, you have to pay tax on that; you have to pay tax on the cattle, on a cart, on a house covered with boards; in short you have to pay taxes on everything you own.

Daily wages are much lower now than they used to be. Money is scarce, and you can get practically nothing but trade in kind unless you know the language and travel to distant markets. I do not deny that if one has good health and a happy disposition, in time it will be easier to make a living. But when the Norwegians have to work for Americans, they are at first much too weak to stand their work. You work strenuously from morning till noon without rest. Then when you have gobbled down your food, you have to start work again. I am reminded of the rush in Norway when we tried to save the dry hay from the rain!

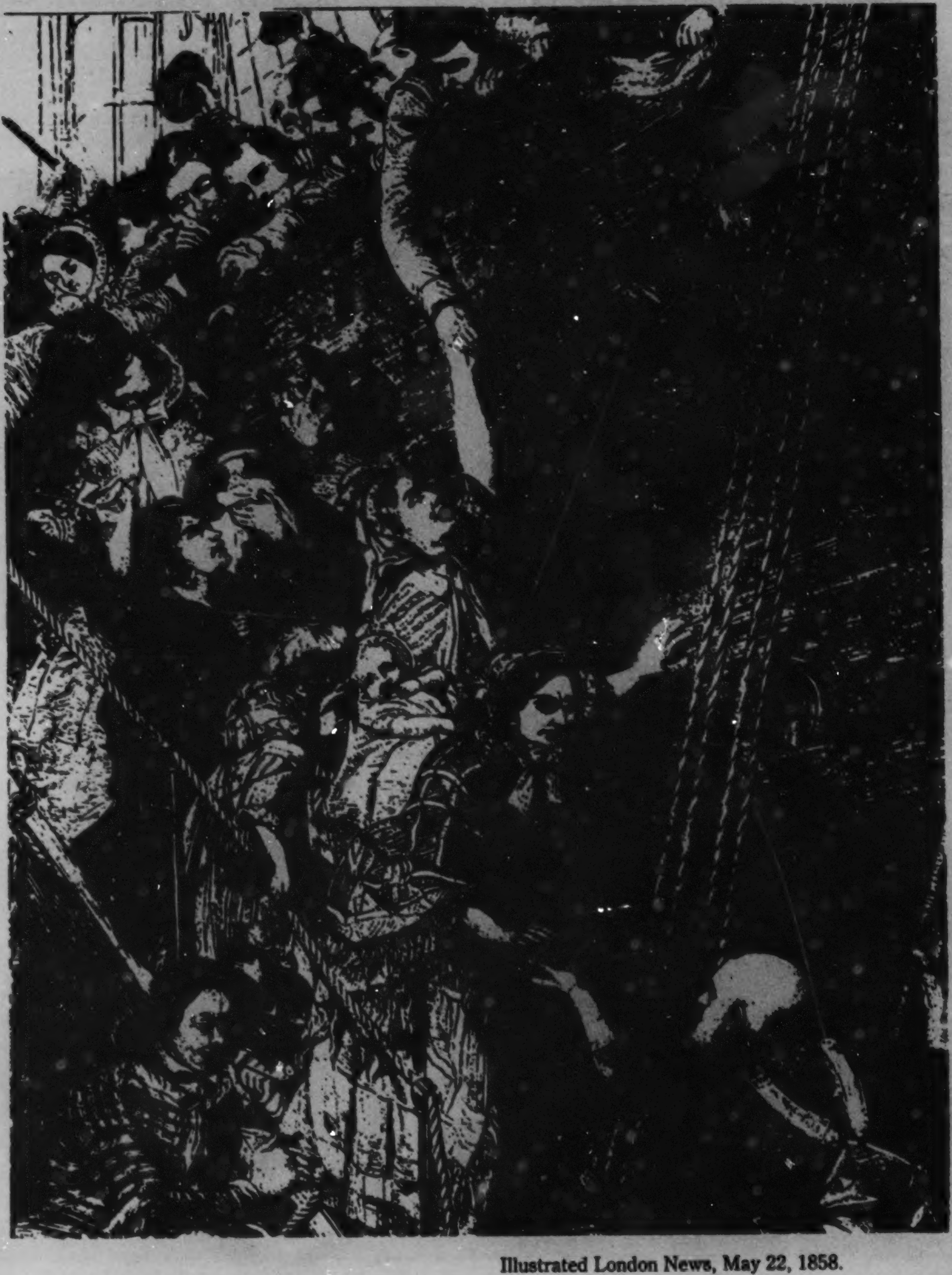
Thus, I do not advise any of my relatives to come to America. If you could see the conditions of the Norwegians in America at present, you would certainly be frightened; illness and misery are so prevalent that many have died. [He lists people from his hometown who have died, 68 adults and children.]

Both my wife and I have been ill with the ague from eight days before Holy-Cross Day to Christmas; but since we feel a little better now, we hope that God will let us live and that in time we shall get our health back. If the Almighty grants us good health and we can make enough money, our greatest wish is to go back to old Norway. When you have neither health nor any pleasures here in America, it is better to live in your native country even if you own nothing. America will always be unhealthful, and no Norseman is ever going to be happy here.

**chills and fever, possibly typhoid fever.

Source:

*Theodore C.Blegen, *Land of Their Choice: The Immigrants Write Home*, University of Minnesota Press, St. Paul, Minnesota, 1951, pp. 180-187. (Adapted and quoted by permission.)



Illustrated London News, May 22, 1858.

Activity 15: Mining History: Students Dig Into The Great Lakes

Historical events often seem flat, clear-cut and tidy when we read about them. Yet as we live through them they can be exciting, messy adventures with no obvious beginning and end. In this activity students use their imaginations and a branching outline technique to predict the elements of a fictional "Mineral Rush," then compare their results to the actual events of the Great Lakes "Copper and Iron boom."

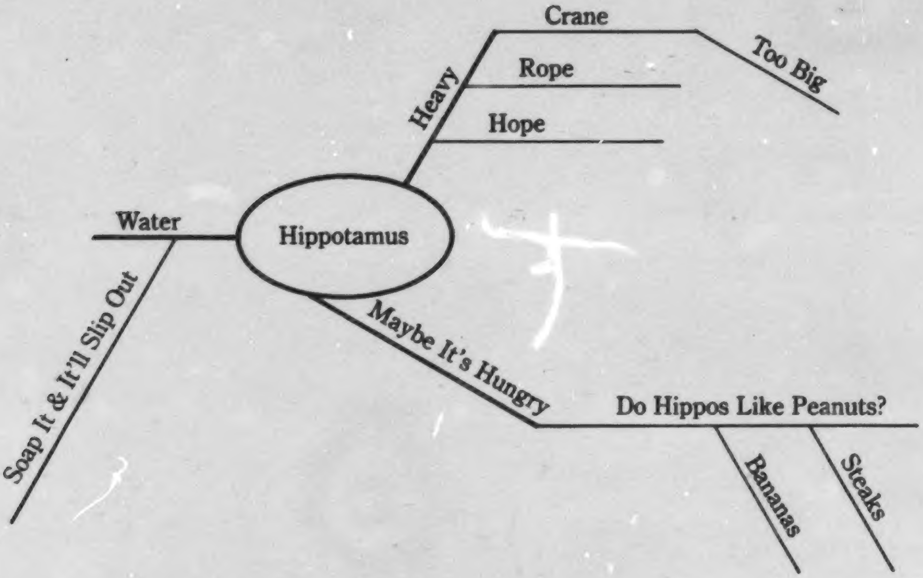
Grades: 7-8
Subject Areas: History, Economics

What do a mystic mountain, where lightning flickers around the rocks, and copper weapons in southern Ohio's Hopewell Indian mounds have in common? They both led to railroads, barbed wire, huge ore carrying fleets and skyscrapers, and helped create the industrial heartland of the Great Lakes region. The "discovery" of copper in 1841 in Michigan's Upper Peninsula created the first big mining boom in U.S. history and led directly to discovery of iron ore deposits three years later. With demand for iron and copper increasing because of railroad and ship building, these deposits became important. Their exploitation resulted in: 1) development of railroads, ports and docks, shipping fleets and the Sault Ste. Marie Locks; 2) immigration of large groups of people into the area to build the transportation links, dig and work the mines, and serve the people; and 3) growth of manufacturing and major cities along the Great Lakes where iron could be smelted and worked using wood or coal. The experience of being "in charge" of a major mining operation helps students appreciate the effort, decisions, costs and successes that lie behind the dates and "facts" of the copper and iron boom.

Procedure

1. Introduce students to the "octopus" planning technique. On paper or the blackboard draw a circle and write a word in the middle of it which represents a problem. For each idea that comes to mind that is related to the problem, write a word or phrase on a line branching out from the circle. As questions, solutions, or other ideas occur to you, add them as additional branches to previous ones or to the main problem. Sometimes one item will fit with two branches. Draw a line linking the branches, and/or repeat the item.

Have students practice the technique with a simple, silly problem like: "How do you get a hippopotamus out of the bathtub?"



There is no "right" way to use the "octopus." It helps keep track of the associated ideas that come out of the brainstorming process. Judgment is deferred during brainstorming. *All answers are accepted.*

2.Introduce students to their assignment:

You are managers of Dig, Inc., a company that specializes in mining valuable minerals. You have just been alerted that a huge deposit of Strong-ium has been located in a remote part of a developing country. Your job is to plan for all phases of the process of getting to the site, setting up a mining operation, getting the mineral out in big enough quantities to cover your costs, making it into a usable form, and finding buyers for it.

Here is some information that will help you:

- The deposit is located in a remote mountainous area. There are no roads, railroads, rivers or airstrips within 50 miles (81 Km) of the deposit. Fifty miles (81 Km) away, however, is a major but undeveloped waterway system which connects to growing cities and developing industries (The waterway has no ports, decks or locks around river rapids.).
- Strong-ium is a very heavy metal. The ore is found mixed with rock. When refined it is an essential, major part of buildings, railroads and other forms of transportation. Should a war be fought, it would require vast quantities of this metal.
- The climate where the mineral is located is extremely hot in summer and bitter cold in winter with as much as 10 feet (3 m) of snow. Twice a year heavy rains last for three to four weeks at a time.
- The nearest workers are more than 800 miles (1290 Km) away. They live in different countries and speak a variety of languages. There are many people who need jobs.
- Far away in big cities there are people with money who want to become richer. The government of the country has money too.
- A small population of primitive people live in the area and hunt on the land.

3. Divide students into teams of 2-4 and give them 20-40 minutes to tackle the problem using the octopus technique.

After the time is up make a summary octopus on the blackboard. Ask groups to review their octopus and circle the one to three most important or well-developed branches. Each group in turn can add one branch to the octopus on the board from the one(s) they have circled on their papers.

4. Copy and distribute the historical summaries in this activity: "Red Gold! Copper and Iron Discovered in Northern Michigan!" Read "Fifty Years of Copper and Iron Mining in the Great Lakes." Read them aloud together in younger groups or silently in older grades. Ask students to compare their mining plan to the history of copper mining in the Great Lakes. Ask:

- How was your plan like what actually happened?
- What things were different?
- Were you concerned about problems that didn't seem to matter in the historical event? Why do you think that's so?
- Did your solution parallel the actions of history? If not, what do you think makes the difference?
- Did your plan take into account how the actions of your company would change?
- In what ways did your plan account for the consequences of your mining activity on the land, the natives, the workers, the waterway, or the country?
- How did the historical events prepare for or anticipate later events?
- Does the experience of trying to "plan" for an event make you think or feel differently about a real historical event like the copper and iron boom? In what ways?

5. Discuss current mining or mineral explorations. Are there any in your area? Do you know of any in the Great Lakes region? How are they different now from 100 years ago? How might they be the same?

Taking It Further

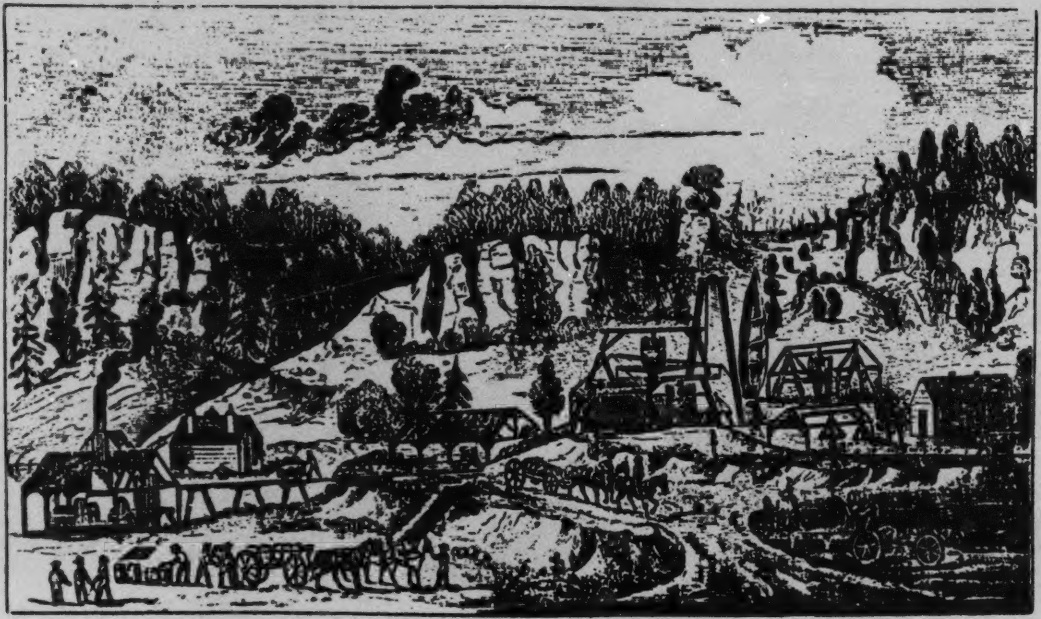
1. Provide students with a map of the Great Lakes. Ask them to find the following locations mentioned in the reading "Red Gold":

Isle Royale
Ontonagon, Michigan
Keweenaw Peninsula
Negaunee, Michigan
Sault Ste. Marie
Jackson, Michigan
Cleveland, Ohio
Detroit, Michigan
The Soo
Milwaukee, Wisconsin
Mineral Point, Wisconsin (lead mining district)

2. Using the scale of miles and kilometers on the map, have students estimate and compare water and land distances for the following:

Keweenaw, Michigan to Detroit, Michigan
Mineral Point, Wisconsin to Negaunee, Michigan

3. Have students investigate how their town was started. How were natural resources important in its founding? How are they important now? How did the Great Lakes affect the town at its beginnings? Do they affect it more, less or the same now? If there is a difference what do you think caused the change?



CLIFF MINE, LAKE SUPERIOR.

Source:

John H. Pitezel, *Lights and Shades of Missionary Life,* Western Book Concern, R.P. Thompson, printer, Cincinnati, 1859, p. 163.

RED GOLD! COPPER & IRON DISCOVERED IN NORTHERN MICHIGAN

Copper is a reddish-gold mineral much used in industry today. It was also valued by people of other cultures and in other times. Hundreds of millions of years ago, an opening in the earth's crust left rich deposits of copper beneath Michigan's Upper Peninsula. An Indian culture called the Old Copper culture living in the area about 3,000 B.C. collected and mined copper. The Indians hammered it to make knives, spear points, gouges and awls (poking instruments for working leather and bark). These Indians were making objects of metal long before the Indians of Peru and Mexico or the peoples of England and France knew the use of the metal. Ancient Indian copper workings are still visible on Isle Royale near Thunder Bay in Lake Superior.

By the time the French Explorers reached the copper country in the 1600's, the Indian cultures which developed and worked the mineral had been gone for about 800 years. Stories of the metal were passed down through the centuries and reported by the French explorers and missionaries.

Many people knew that copper was present in the Lake Superior area but not until 1841 did two events stimulate serious mining efforts. Douglass Houghton, Michigan's first state geologist, published an official report describing the wealth of copper around the lake. Then a Detroit businessman, Julius Eldred, started a well- publicized campaign to remove a large copper boulder from Ontonagon and put it on public display in Detroit.

In 1842 the U.S. government made a treaty with the Chippewa Indians. The Chippewas ceded 25,000 square miles of land to the Federal government in return for money appropriated by Congress. Houghton continued his geological and topographical surveys for the state of Michigan and added to them other surveys for the U.S. government. By 1843 when the copper rush began, the surveys were mostly completed and mining permits could be issued in an orderly fashion.

[illegible] hardy souls came overland into the district [illegible] the Wisconsin lead mining lands as early as the summer of 1843, but it was not until the spring of 1844 that the real boom began. Several schooners owned by the fur companies were operating on Superior at that time. During the following two years, a half dozen more were hauled over the portage at Sault Ste. Marie to carry explorers, miners, speculators, and their supplies up to Keweenaw. The schooners also took small quantities of copper and hundreds of disillusioned prospectors back. Mining and shipping were extremely difficult.

Shipping the copper from the mines to Buffalo and from there to Boston took 20 to 25 days, the cost running from $18 to $20 per long ton. A long ton weighed 2240 pounds. (At about this same period the rate on a long ton of ore from Chile to Boston was $14, from Cuba to Boston, $6.) Cargoes had to be hauled by human or animal almost a mile across the portage at Sault Ste. Marie and then reshipped on the other side. Even worse, navigation was impossible for at least five months of the year because of winter storms and ice formations along the shore of Lake Superior. Shipping was apt to be risky even during the summer season. Although there were a number of harbors on the peninsula, most were blocked by sand bars to all but the smallest vessels, and passengers and supplies often had to be transferred to small ships before shore could be reached.

Prospectors called it "a howling wilderness," perhaps a fitting description for the copper country. The peninsula was heavily wooded, swampy in many places and cut off by land from the outside world by over 200 miles of virtually uninhabited wilderness. Only those people experienced in woodland travel or those fortunate enough to have at their command a sleigh and dog team could reach civilization once the snows began in November.

While hundreds of miners tramped the wilderness equipped with a pick and a few pounds of gunpowder, Douglass Houghton was continuing his survey work. In September 1844, the surveyer's compass needle went crazy, swinging wildly in all directions. He had discovered iron near Teal Lake.

Rumors about the iron deposit traveled east to Detroit, Cleveland, Buffalo and Boston. A party from Jackson, Michigan, led by Philo Everett met Tipo-Keso an Indian whose name meant Full Moon. She directed them to a mystic mountain where lightning flickered around rock outcroppings. They climbed 15 miles up a slope to a Chippewa camp above Teal Lake where Chief Margi-Gesick took them up to the hill that drew dancing lightning. Under a large pine Everett's party chopped loose a huge boulder of iron ore. That boulder is displayed in the Smithsonian Institution. At the place to be called Negaunee (Ojibway for "the first"), Everett carried in a forge and bellows, cut maple for fuel, and began to make iron in the wilderness.

Sources:

Margaret Beattie Bogue and Virginia A. Palmer, *Around the Shores of Lake Superior: A Guide to Historic Sites*, University of Wisconsin Sea Grant College Program, University of Wisconsin Press, Madison, Wisconsin, 1979, p. 124.

William Donohue Ellis, *Land of the Inland Seas: The Historic and Beautiful Great Lakes Country*, American West Publishing Company, Palo Alto, California, 1974, pp. 195-204.

William B. Gates, *Michigan Copper and Boston Dollars*, Harvard University Press, Cambridge, Mass., 1951,pp. 1-4.

George Irving Quimby, *Indian Culture and European Trade Good*, University of Wisconsin Press, Madison, WI, 1966, p. 18.

Fifty Years of Copper and Iron Mining in the Great Lakes

1818–1909	- Huge numbers of immigrants moved from Western Europe to the Great Lakes area. (Southeastern Europe provided the most immigrants at the turn of century. People also came from the East and South of the United States.
1830's–1885	- Great railroad-building era throughout U.S. (transcontinental railroad completed in 1869).
1844–1865	- Sale of shares in copper and iron mines. Stock market speculation on shares. Luckiest stock holders made 200% a year on their investment.
1848	- Smelters established at Cleveland, Ohio (using Kentucky coal)
1848	- 1851-German immigrants escaped from Germany after the revolution of 1848. Many settled in Milwaukee, bringing skills for building machine tools.
1850	- Smelters established at Detroit, Michigan.
1850	- First steam-powered winding engine installed at Cliff mine in Keweenaw to raise ore from depths of 800 to 1500 feet.
1852–58	- Railroad constructed in Marquette Iron country made moving ore in summer possible. (Without roads and railroads, ore was mostly moved in winter with horses and sleighs.)
1853–1855	- Soo Locks built. Eliminated need to unload ships at the Lake Superior outlet to St. Mary's river and to carry ore through town and reload at Lake Huron end.
1855	- First large-scale shipments through Soo Locks, 7000 tons.
1860	- Smelters established at Hancock, Michigan (Keweenaw peninsula).
1861–1865	- U.S. Civil War first disrupted copper and iron sales to Europe, then created demand for brass buttons, copper canteens, bronze cannon, iron cannon balls and bullets. Prices went up.
1862	- 14 mile channel to Portage Lake Copper Mining district dredged. Large vessels could travel up to mine landings. Ore no longer had to be loaded on small boats (lighters) then re-loaded onto larger boats at end of channel.
1864	- Lake Superior Copper Mining Companies send a delegate to Sweden to enlist 10,000 miners, offering to lend ocean fare. Swedes came under contract to the copper mines for $250/year.
1866–90	- James Pickands sent coal and hardware goods north to Marquette, pig iron south. To save paying freight rates he bought the vessel, the first in what became a huge shipping fleet.
1872	- Railroad connections to Chicago made winter shipment of ores possible (when lake shipping was closed by ice).
1880's	- Railroad-building era ended. Maj. William Le Baron Jenney showed builders how to use steel frames for building. Construction's iron age began. Skyscrapers then possible.

Activity 16: Student Investigation: Critiquing History And Social Studies Books From The Great Lakes Perspective

In this exercise, students review the importance of the Great Lakes region in the U.S., and analyze the amount of information about the Great Lakes provided in textbooks.

Grades: 7-8
Subject Areas: History, Social Studies, Language Arts

Did you know that:

- Lake Superior is the largest body of surface fresh water in the world?
- One fifth of all the surface fresh water in the world is in the Great Lakes?
- Fifteen percent of the population of the United States and fifty percent of Canada's population work and live in the states and provinces that border on the lakes?
- Many of the jobs in the region came about because of the lakes and many still survive because of them?
- The port of Duluth is one of the top 10 in shipping tonnage in the U. S.?
- The Great Lakes industrial region produced one-third of the equipment for the invasion of Europe in World War II? (Over 61 billion dollars worth of equipment and munitions)
- The combined area of the Great Lakes is larger than England, Scotland and Wales?

The Great Lakes region is very important to the United States. Its history is long, rich and varied. Its cities and states are populated with people from throughout the world. Yet it is often given little notice in history and social studies textbooks. The following activity allows students to discover the relative weight given to the region in their texts. If they find relatively little information, they can suggest important topics or issues that might be covered and write to the people in charge of publishing the textbook.

Procedure

1. You may wish to do this activity after several others in this booklet, or after assigning students library research to bring back two or more "Did You Know" statements like those above. Review the history and importance of the Great Lakes. Develop a list of important facts, issues and topics about the lakes.

2. Work with students to select one or more geographic areas to compare to the Great Lakes region. Different groups may want to select different areas. Ask students to provide reasons for their selections.

3. In small group discussions students may brainstorm different criteria for comparing how the two regions are treated in their history or social studies textbooks. These may be as simple as counting the number of words, lines or pages which discuss the areas; they may be more complex, such as are the important topic areas covered for each region? Review the criteria in large group discussion and come to a consensus about what they mean and how they can be measured. Discuss and agree upon the important topics to be covered (e.g. history, economic importance, current and future issues, environment, etc.).

4. Assign students to review one or more textbooks using the criteria they have developed. Review with them the use of indices, tables of contents, and cross-reference techniques. Discuss ways to organize their information as they collect it.

5. Summarize your students' findings on the blackboard or on a sheet of white paper on the bulletin board. Compare the coverage of the Great Lakes to the coverage of the other region(s) your students have selected, using the criteria they developed as a group. Keep track of any information the students found which doesn't fit into the categories they developed.

6. In class discussion review students' findings. Discuss the way the Great Lakes are covered in the textbooks. Decide collectively whether the Great Lakes are adequately represented. Have

your students develop questions for the publisher of the book(s). Some sample questions follow:

- How does the author decide what to include and what to leave out of a book?
- What factors influence decisions?

Here is our comparison of the Great Lakes Region and ____________[other region(s)]. How did you decide how much emphasis to give to each area?
We think the following topics relating to the Great Lakes should be included in the next edition of the book for the following reasons.

7. Discuss any information that did not fit into the categories. How does it contribute to your understanding of the regions? What purpose does it serve in the book?

8. Put your questions and research into the form of a letter and send it to the publisher of the book. The current address of the publisher can be found in *Writer's Market*, Writer's Digest Books, published yearly. A more general address can be found in the front of *Books in Print*. Check with your school or community librarian for help.

Taking It Further

1. If there is anyone in your community who writes non-fiction books, invite her or him to your classroom to talk about the process of researching and writing books. Focus specifically on how the author decides what to include and what to leave out.

2. Develop publicity campaigns on the importance of the Great Lakes. Using the "Did You Know" statements and the topics developed as criteria for evaluating the textbooks, develop bulletin board, poster or other displays for your school and community.

Activity 17: Astronaut's View Of The Great Lakes-Global Perspective

Students gain an appreciation of the size and role of the Great Lakes in supporting large populations in the U.S. and Canada. Weather satellite maps give an actual "outer space" perspective. This activity can accompany a general unit on mapping and can be paired with Activity 10, "Explorer's View of the Great Lakes."

Grades: 4-8
Subject Area: Geography

The Great Lakes are the largest inland bodies of fresh water in the world. Only the inland Caspian Sea is larger in area but it is salt water. This activity gives students an opportunity to compare the size of the lakes to other inland bodies of fresh water. They are also asked to discuss the role that any body of water - ocean or lake - has in attracting people to an area.

For this activity you will need a map of North America, a world map or globe and an atlas. Satellite maps of the Eastern United States are included. You might wish to borrow or purchase LANDSAT mosaic maps of your portion of the Great lakes region. The mosaic maps of Michigan and Wisconsin are about 30" x 40" and cost $28 in 1981. The mosaic of Ontario province is 28 1/2" x 29 1/2" and cost $20 in 1981. Individual LANDSAT images show areas 115 Km (71 mi) on a side. You can specify the image for a small area you might wish to study (such as your community or a small segment of the Great Lakes shore).

To Order U.S. LANDSAT maps contact:
Aerial Photo Field Office,
AFCS - USDA
2222 W. 2300 S.
P.O. Box 30010
Salt Lake, Utah 84125

Ask for a Sheet D (Wisconsin) and/or E (Michigan) Mosaic of LANDSAT Imagery of Coterminous U.S., 1:1,000,000.

To Order Canadian LANDSAT maps contact:
Canada Map Office
Surveys & Mapping Branch
615 Booth St.
Ottawa, Ontario K1AOE9

Ask for Black & White LANDSAT mosaic, Ontario Province, 1:2,500,000.

The satellite image maps included in this activity and several others are taken by a weather forecasting satellite called the DMSP (Defense Meteorological Satellite Program). Each orbit of the satellite takes images of an area 3000 Km wide. Its purpose is to relay information about weather to the Air Force Global Weather Center at Offutt Air Force Base in Nebraska.

Satellite images are not direct photographs, but rather reconstructed images. Sensing equipment in the orbiting satellite scans the earth's surface. The earth is divided into small segments (1/2 km on a side for the DMSP satellite) called pixels. The scanning equipment evaluates the brightness of light in the pixel and assigns a number between 1 and 64 to it. Thus, light information is converted into a series of numbers. (Either visible light or infrared energy may be recorded.)

The digital information is transmitted to the earth by radio frequencies. It is recorded at one of two receiving stations in the U.S. and transmitted to computers. The computers reconstruct the shades of light and darkness coded in the numbers and create a photographic image. The 8 × 10 photograph reproduced in this activity contains information from many tens of thousands of pixels.

LANDSAT images contain much more information about landforms and vegetation than do these DMSP Clear Day images because the satellite makes images of much smaller areas (115 Km on a side compared to 3000 Km).

The satellite weather image you may see on television weather programs comes from "GOES," the Geostationary Weather Satellite. It remains in stationary orbit over the earth at a high enough altitude to observe and transmit images of the whole face of the earth at one time. The one from which we see the U.S. is one of five in place around the world. You may wish to explain some of this information to your students as they review the satellite images included in this activity.

Procedure

1. Display maps of North America, the world and the globe if you have one. Students can work in small groups so they can get close enough to the maps to read them. Make sure the maps are in the same or similar scales.

2. Review map reading skills. Ask students to locate and discuss major map features such as latitude and longitude, scale and compass directions. Identify various symbols and interpret their meanings. Locate natural features, political boundaries, etc.

3. Display the satellite image of the Great Lakes region. Ask students to compare it with the map of North America they are reviewing. Ask: How are the maps similar and different? Can you find the boundaries of your state on the satellite map? Why or why not?

4. Now look at the satellite image of the Eastern United States at night. What can you see on this image that is not shown on the map of North America? Make the link between the brightness of the light areas (which are actual lights at night) and the density of population. Ask: How might large populations affect the land and water resources of an area?

5. (Optional math activity) Have students lay a transparent grid over a world map. Using the grid, estimate what percentage of the world's surface is covered by salt water. What percentage is covered by fresh water? Of the area covered by fresh water, what percentage is contributed by the Great Lakes? (Oceans and seas are salt water.)

6. Divide students into groups or let them work alone to answer questions on the Astronaut's View Worksheet.

7. After students have completed the worksheets compare their answers and discuss them. Also ask:

- Why do you think so many people live in cities on lakes or oceans?
- What problems do you think cities not on lakes might face?
- How do you think those cities might want to solve those problems?
- If you were in charge of a Great Lakes state, what would you do if a state like Texas wanted to build a pipeline for water from the Great Lakes? What might happen if you refused? If you agreed?

Taking It Further

1. Make one or several posters of the important ideas in this activity.

2. Stage a mock debate between water-short areas of the United States or Canada and the water-rich areas of the Great Lakes. What charges and counter-charges, threats and counter-threats might each side offer?

Worksheet - Astronaut's View

Study a map of *North America* to answer questions 1-8. To help you estimate sizes, find a convenient object such as your thumb, a pencil or a piece of paper with which you can measure. If you want to be more exact, use a ruler and the scale given on the map.

1. Name any inland lakes you can locate that are similar in size to *all* of the Great Lakes combined.

2. Name any inland lakes that you can locate that are similar in size to any *one* of the Great Lakes.

3. Name the largest inland freshwater lake other than the Great Lakes.

4. Estimate how many times larger Lake Ontario is than the largest inland lake.

5. Estimate how many times larger Lake Superior is than the largest inland lake.

6. Name as many states and provinces as you can which are smaller than Lake Superior, the largest of the Great Lakes. (There are 10 states and 3 provinces.)

7. Name as many states and provinces as you can which are smaller than Lake Ontario, the smallest of the Great Lakes in surface area. Lake Erie is the smallest in *volume* of water. (There are 4 states and 1 province)

8. Using a thin sheet of paper, lightly trace the boundaries of each Great Lake from your map. Cut and tape all the boundaries together as closely as possible on a thicker sheet of paper so you get a compact shape which shows approximately how big all the lakes are together. List 3 states which are similar in size. (There are 7 states whose area is within 10,000 square miles of the area of all the Lakes together.)

9. The following is a list of the 10 United States cities with the highest populations (1980 figures). New York has the largest population and appears first, Chicago is second and so on. Circle the cities which are located on the Great Lakes or the St. Lawrence Seaway.

New York
Chicago
Los Angeles
Philadelphia
Houston
Detroit
Dallas
San Diego
Baltimore
San Antonio

10. How many and what percentage of the 10 largest U.S. cities are located in the Great Lakes area? Why is this important?

11. Eight of the 10 have a similar major location feature. What is it? Why is it so important?

12. Following is a list of the ten Canadian cities with the largest population (1970 figures). They are listed in descending order. Circle the cities located on the Great Lakes or the St. Lawrence Seaway.

Montreal
Toronto
Vancouver
Hamilton
Quebec
Calgary
Ottawa
London
Windsor
Halifax

13. How many and what percentage of these cities are located on the Great Lakes?

14. Why do you think this is the case?

15. Now look at a *world map* or atlas. Locate any fresh water lakes of similar size to any of the Great Lakes. (Note: Some atlases list major lakes and their areas in square miles in the back of the book.) If you are estimating by looking at two maps, make sure they are in the same scale.

A. What lake is closest in area to Lake Superior?

B. Name the countries and continent where the lake is located.

C. What two lakes are similar in area to Lake Erie?

D. Where are they located?

16. What conclusion can you draw about the role of the Great Lakes in the world's supply of fresh water?

17. Name several uses for fresh water:

Worksheet Answers

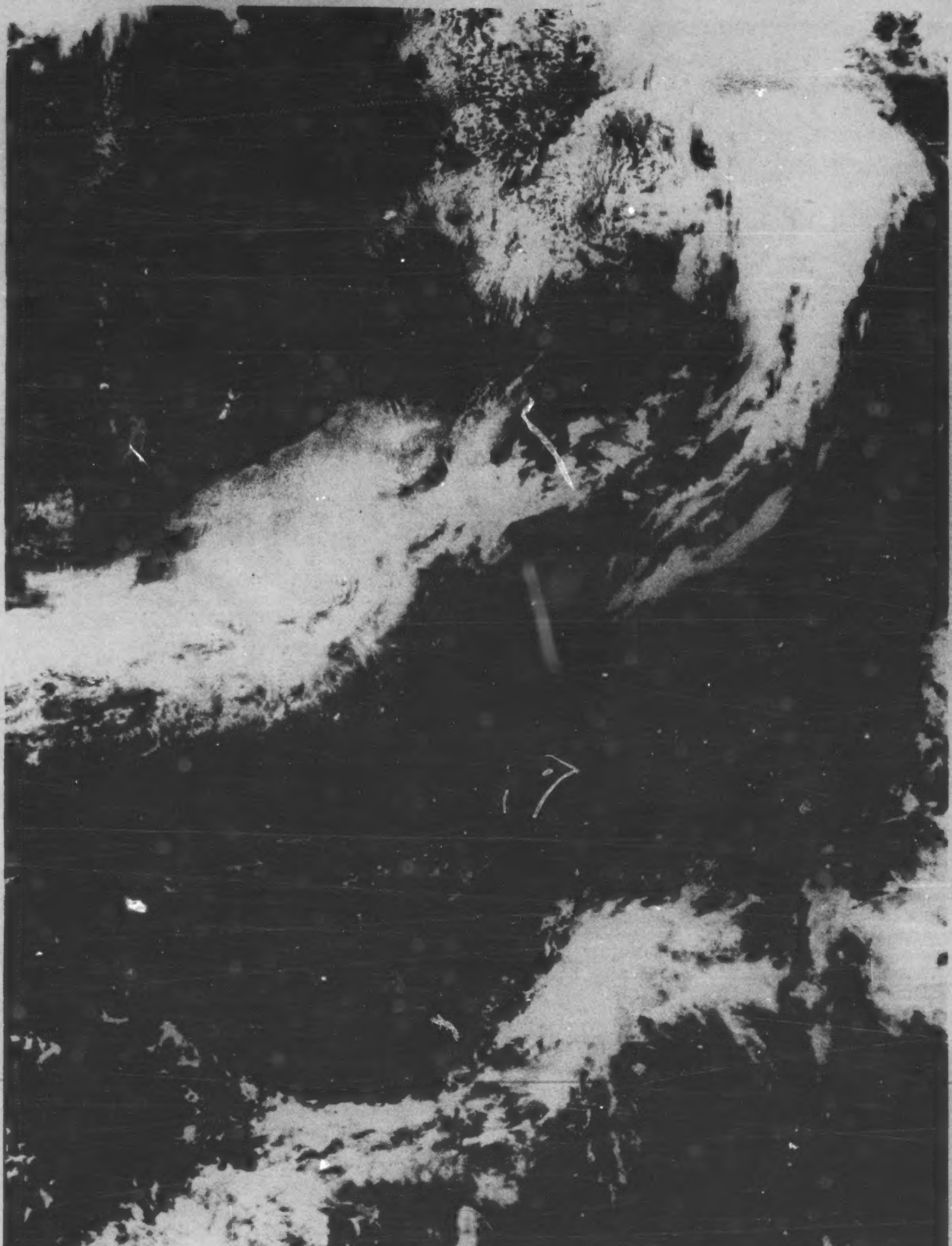
1. none
2. none
3. Great Salt Lake
4. Lake Ontario is 6-7 times larger than the Great Salt Lake in area.
5. Lake Superior is almost 30 times larger in area.
6. Connecticut, Delaware, Hawaii, Maryland, Massachusetts, New Hampshire, New Jersey, Rhode Island, Vermont, West Virginia, Nova Scotia, Prince Edward Island, New Brunswick
7. Connecticut, Delaware, Hawaii, Rhode Island, Prince Edward Island
8. Colorado, Idaho, Iowa, Minnesota, Oregon, Utah, Wyoming

9 Chicago, Detroit 10.2, 20% 11.They are port cities and located on a major body ofwater or have access to one (eg. Philadelphia). The cities all value the water for transportation, food and manufacturing.

12. Montreal, Toronto, Hamilton, Quebec, London, Windsor 13.6, 60%
14. Transportation, history of Canada, dependence on furtrade, milder climate compared to inland areas.
15. a. Lake Victoria
    b. It is bordered by Tanzania, Kenya and Uganda in Africa.
    c. Lake Winnipeg, Great Salt Lake
    d. Manitoba and North West Territories, Canada
16. The Great Lakes contain one fifth of the world's surface fresh water.
17. Drinking
    Washing
    Irrigating crops
    Washing & cooling in food preparation & manufacturing processes
    Cooling in power generation plants

Source:

Information for this activity was drawn from the *Hammond Citation World Atlas*, Hammond, Inc., Maplewood, N.J., 1979.



DMSP Satellite Visual Image—Great lakes Region—October 20, 1978

DMSP Satellite Visual Image—Eastern United States at Night—February 1, 1979

Activity 18: Chart Your Course-Reading A Navigational Chart

Good maps are fascinating gold mines of information. Students gain skill in map reading by interpreting an actual navigational chart in this activity. This activity may be paired with Activity 10, "Explorer's View of the Great Lakes - Historical Perspective," which introduces map-making and map reading skills.

Grades: 6-8
Subject Areas: Geography, Mathematics

The St. Mary's River navigational chart used in this activity is particularly interesting because the area has a variety of features including an international border. Turn students on to unraveling the intricacies of map reading. It is a joy and a skill they will appreciate. Treat the activity as a mystery game where students become detectives looking for clues.

Procedure

1. To do this activity you will need a map of the Great Lakes region which shows Lakes Superior and Huron and the St. Mary's River area. Libraries, school or public, often subscribe to National Geographic Magazine and may permit maps to be borrowed. If you don't have a regional map, the National Geographic map: "Close- up: USA, Wisconsin, Michigan and the Great Lakes" will be useful. It is available for $5.00 (in 1983) from:

National Geographic Society
P.O. Box 1269
Washington, D.C. 20013
(800) 368-2728

You also need the St. Mary's River navigational chart, (36" x 48") which costs $5.00 (in 1983). Order St. Mary's River, Lake Huron to Lake Manuscong Chart No. 14882. You may also wish to order a navigational chart of a Great Lakes area near you. A complete listing of Great Lakes charts is found in Catalog No. 4, Catalog of Navigational Charts for the Great Lakes. It is available free of charge from the distributor listed below. You may also wish to order Chart No. 1, Navigational Chart Symbols and Abbreviations, which is a complete description of how to read navigational charts, including a key to all the symbols. There are regional distribution sources. The national distributor is:

U.S. Department of the Army
Lake Survey District, Corps of Engineers
Distribution Division (OA/C44)
National Ocean Survey
Riverdale, Maryland 20737
(301) 436-6990

For a complete listing of Canadian charts, order Catalog #3, Catalog of Nautical Charts and Related Publications for the Great Lakes, from:

Hydrographic Chart Distribution Office
Dept. of Fisheries and the Environment
1675 Russell Rd.
P.O. Box 8080
Ottawa, Ontario, K1G 8H6
(613) 998-4931

2. Working with groups (6-8 students should be able to work around one map) or individuals, help students become oriented to the major features of the regional map and the navigational chart using the Chart Your Course worksheet included here. Encourage students to notice and figure out the symbols and other information given on the map.

3. Assign navigational problems which follow the worksheet.

Taking It Further

1. Using U.S. Catalog #4 or Canadian Catalog #3, order a navigational chart for a Great Lakes area near your community or for the Great Lakes community you contacted in Activity 6.

2. If you have access to a computer try "Geography Search" available from McGraw-Hill Book Co., Schools Division, 1221 Avenue of the Americas, N.Y.,N.Y. 10020. This program allows students to role-play sailors on ancient ships searching for the New World. They navigate using the sun, stars, ocean depth, climate and tradewinds.

3. Invite a visitor to your classroom who has sailed on the Great Lakes. Possiblities include: Coast Guard representative; someone who works or worked on freighters, ferries, fishing boats, tugs, research boats, etc; recreational and competitive sailors; charter boat skippers, etc.

Resources:

Books

Barry, James P. *Ships of the Great Lakes: 300 Years of Navigation*; illus., Howell-North Books, Berkeley, CA, 1973. The vessels that people used on the Great Lakes reflect the people themselves and their purposes. The Indian paddling a canoe evokes a whole culture; the master of a bulk freighter scanning a radar screen brings out a completely different one. The story of the people and the ships that sailed the Great Lakes is the story of developing America.

Bowen, Dana Thomas. *Shipwrecks of the Lakes: Told in Story and Picture*, illus.; Freshwater Press, Cleveland, Ohio, 1971. (grades 5-8) Stories of great shipwrecks that have taken place on the Great Lakes.

Chart Your Course

First study a regional map of the Great Lakes to answer the following questions:

1. The St. Mary's River connects two Great Lakes. Water from which of the Great Lakes flows into the St. Mary's River? (Hint: water in the Great Lakes flows toward the Atlantic Ocean) Where does water from the St. Marys River go?

2. Name the major cities located along the St. Mary's River.
3. Name and locate the countries for which the St. Mary's River is the national boundary.
4. Find De Tour Village on your regional map. With your finger or a pencil circle the approximate area covered by the St. Marys River Navigational Chart.
5. Now look at the St. Marys River Navigational Chart. What is the scale of the chart in miles to the inch? _
What is the scale in meters to the inch? _______
6. Find the latitude and longitude lines on the navigational chart. What is the latitude and longitude of De Tour Village to the nearest lines marked on the chart?
7. If you were sailing from Pipe Island to Barbed Point, in approximately what direction would you be going? What would you see in each compass direction?

____

____

____

8. What do the numbers called soundings printed on the chart tell you? What scale are the soundings given in?

____

____

____

9. What do the lines drawn between sounding numbers tell you? Look at the lines on Time Island. How are they similar/different from lines in the water area?

____

____

____

10. If you were a skipper of a boat, when would you use the soundings provided?

____

____

____

11. Look up the definition of a fathom and write it down here:

____

____

____

Challenge Question: How did a fathom get to be the size it now is?

12. What mathematical formula would you use to convert soundings given in feet (meters) to fathoms?

13. Convert these soundings from feet (meters) to fathoms:

a) 60 ft ________ fathoms
b) 24 ft ________ fathoms
c) 33 ft ________ fathoms
d) 74 ft ________ fathoms
e) 23 ft ________ fathoms
f) 80 ft ________ fathoms

14. Locate the international border. List four islands or bays located on the Canadian side of the border.

15. List four islands or bays located on the United States side of the border.

16. Find the signal light at the end of De Tour Reef. A portion of the light shows red as indicated by the arch. Red indicates an area where caution should be observed.

Circle the color that the light would appear to you if your boat was in each of the following locations:

St. Vital Bay	Red	White
South Of Crab Island Shoal	Red	White
Carlton Bay	Red	White
Southeast of the Signal Light	Red	White

If the light appears red to you, your instructions are to move to a location where the light will appear white. Why would this be necessary?

ANSWERS:

1. Lake Superior
2. Sault Ste. Marie, Ontario and Sault Ste. Marie, Michigan
3. Canada, United States
5. 5/8 mile to the inch. 1000 meters to the inch.
6. 46 00' N. Latitude, 83 55' W. Longitude
7. South
8. Depth of water in feet.
9. Contours of the lake bottom, location of shoals or shallow areas. Lines on Time Island are similar because they show contours of elevation; they are different because they show changes of 20 feet where shoal lines show changes of 6 feet (one fathom).
10. Charting course, heading for harbor or docks.
11. A unit of length equal to 6 feet (1.8 meters), used especially for measuring the depth of water.
12. *feet*/6 = fathoms;
13. a) 10, b) 4, c) 5-1/2, d) 12-1/3, e) 3-5/6, f) 13-1/3
16. red, white, red, white to avoid areas of uncertain depths (eg. shoals) along the shore

Two Navigational Problems

1. You are the skipper of a 28 foot sailboat with a draft of 5 feet. (Draft is the depth of a boat below the water line.) Your boat is equipped with a small motor. You are midway through De Tour Passage near Frying Pan Island. Winds are currently out of the north at 12 miles per hour. A squll appears on the horizon. The shapes of the clouds indicate it will bring very strong, gusty winds. (Winds in squalls can be as high as 60 m.p.h.) You can't afford to risk being out in the squall which will reach you in an hour or less. You can sail south at about 7 miles per hour, motor any direction at about 3 miles.

A. On the attached photocopy section of the St. Mary's Navigational map, circle the bays, harbors or other sheltered areas that would provide protection for you during the storm. (Hint: which way must the bay's opening face to protect you from the wind?)

B. Find two harbor locations where you could tie your boat to a pier. Check the course that you must follow to reach it. Make sure that the channel you select into the harbor is not too shallow for your craft.

C. Mark the route to your preferred shelter. Make sure you don't run aground on any shoals. Give your reasons for selecting that shelter.

D. Estimate the distance in statute miles to this harbor from Frying Pan Island and how long it would take you to get there.

__________________distance

__________________time

2. You have chartered a 38-foot sail boat with a draft of 6 feet. Chart your course on the map for vacation (1-3 days). Find places you would like to visit. Show your round-trip course in pencil on the map. You will begin from and return to the small town of Drummond.

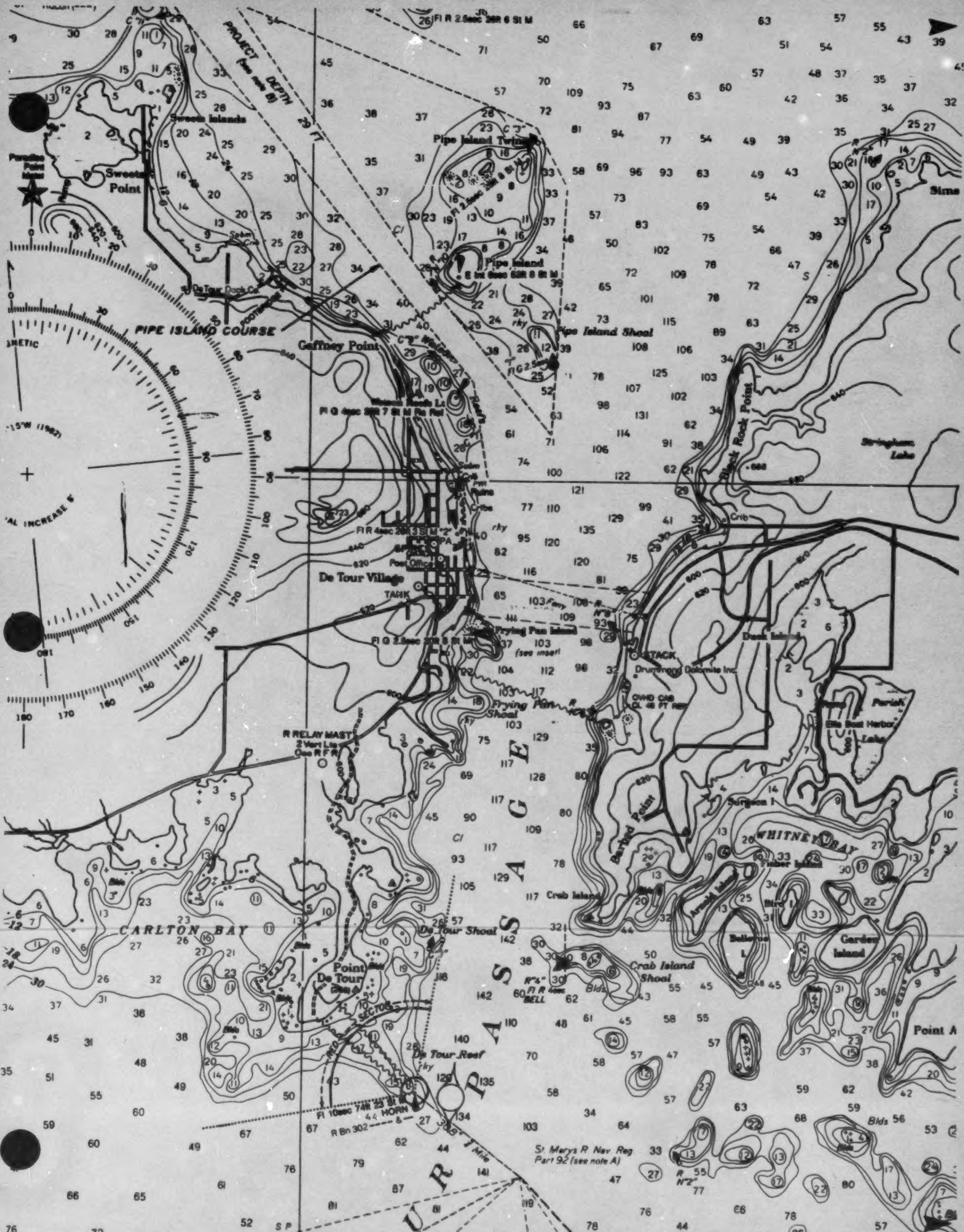
Your yacht can sail at a speed of 4 - 8 m.p.h. depending on the winds. You have a small motor for traveling up narrow channels and docking at piers, but it is slow. Make sure you have planned a journey of realistic length, given your sail and motor capacity.

Remember you are on vacation and don't have to get anywhere in particular. These are treacherous waters with many rocks and shoals and you are an inexperiencedskipper. You can't sail at night. All night anchorages must be in water less than 20 feet deep in a protected harbor or bay. Indicate each evening's anchorage with an X on your course. Explain why you have chosen the course and what you plan to do and see on your vacation.

For this problem you do not need to give compass readings.

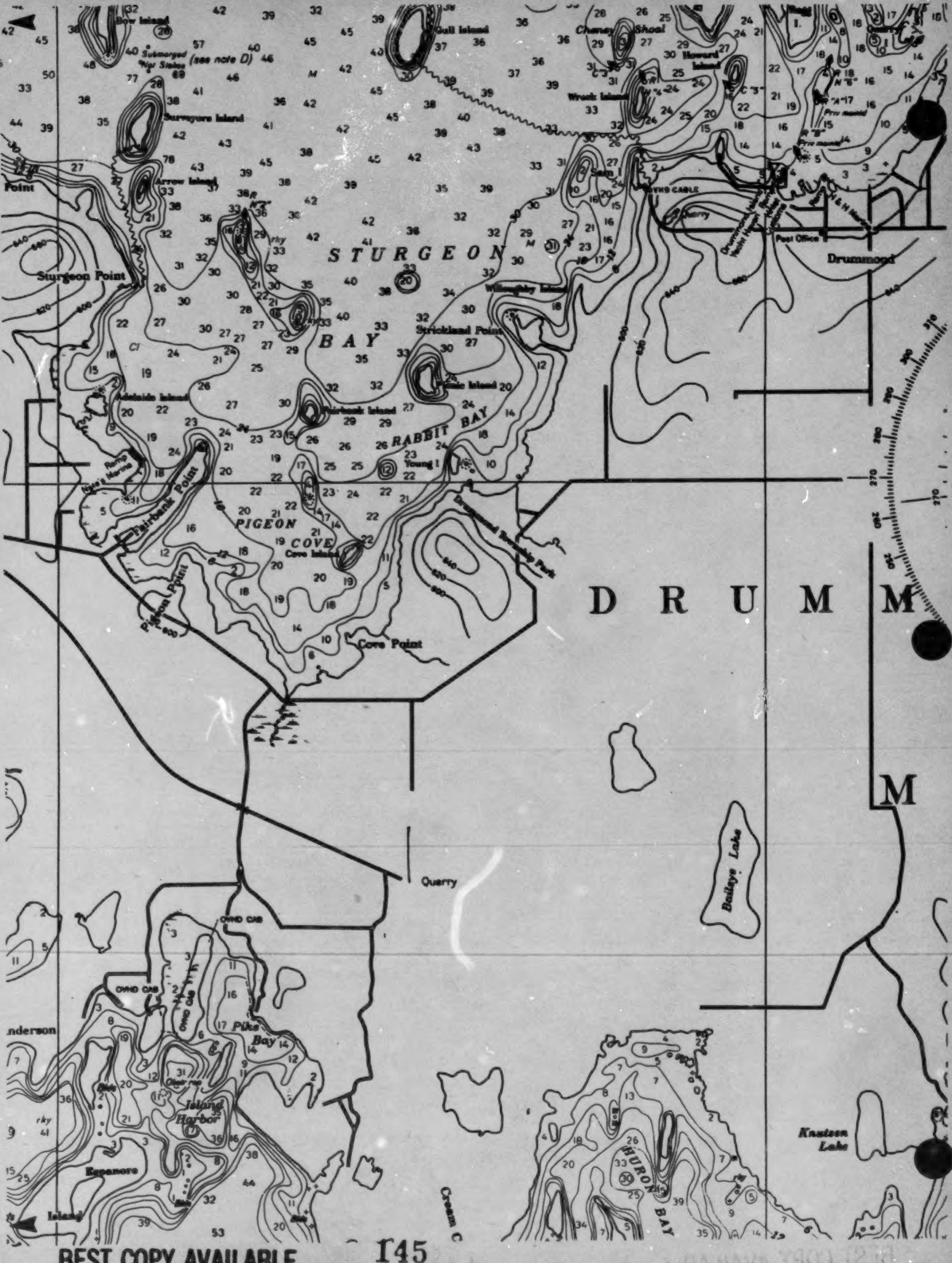
Answers To First Navigational Problem:

1. De Tour Village Harbor, Whitney Bay, Carlton Bay
2. De Tour Village Harbor, Ellis Boat Harbor (in Whitney Bay)
4. De Tour Village Harbor: less than 1 mile, about 15 to 30 minutes using motor.
Whitney Bay 3-1/2 to 4 miles, about 1 hour using sails and motor.
Carlton Bay about 5 miles, about 1-1/4 to 1-1/2 hours using sails and motor.



Sweets Islands
Sweets Point
Paradise Point Island
PROJECT DEPTH 29 FT (see note B)
De Tour Dock Co
PIPE ISLAND COURSE
Gaffney Point
Pipe Island Twins
Pipe Island
Pipe Island Shoal
De Tour Village
TANK
Post Office
Frying Pan Island
Frying Pan Shoal
R RELAY MAST 2 Vert Lts Occ R F R
CARLTON BAY
De Tour Shoal
Point De Tour
De Tour Reef
HORN
R Bn 302
Crab Island
Crab Island Shoal
BELL
St Marys R Nav Reg Part 92 (see note A)
DE TOUR PASSAGE
STACK
Drummond Dolomite Inc
OVHD CAB CL 46 FT
Dark Island
Barbed Point
Sturgeon I
WHITNEY BAY
Fisher Island
Arnold Island
Bird I
Bellevue I
Garden Island
Point A
Paris Lake
Black Rock Point
Stringham Lake
Sims
MAGNETIC
15°W (1982)
ANNUAL INCREASE 6'

BEST COPY AVAILABLE


Bow Island
Submerged Pipe Stakes (see note D)
Gull Island
Cheney Shoal
Howard Island
Wreck Island
Surveyors Island
Arrow Island
Sam I
Point
Sturgeon Point
STURGEON BAY
OVHD CABLE
Quarry
Post Office
Drummond
Willoughby Island
Strickland Point
Adelaide Island
Picnic Island
Fairbank Island
RABBIT BAY
Young I
Ramp
Nye's Marina
Fairbank Point
PIGEON COVE
Cove Island
Drummond Township Park
Pigeon Point
Cove Point
DRUMM
M
M
Quarry
Baileys Lake
OVHD CAB
Pike Bay
Island Harbor
nderson
Espanore
Island
Cream C
HURON BAY
Knutson Lake

BEST COPY AVAILABLE

Reading A Compass Rose—A Navigational Problem For Experienced Skippers

Look at the example attached as you read the following explanations:

Navigation and general orienting is done by first determining the compass reading in degrees (0-360) of the course that you would like to follow and then by continually watching the compass and clock and how long it should take you to travel to a specific point to insure that you are "on course." Initially a skipper draws a line or several lines to indicate the course to follow. For each line drawn a line must be drawn *parallel* to it on the compass rose that intersects its mid-point.

For example, to travel from Milford Island to Chippewa Point and then to Cherry Island, first draw a line to indicate your course. Now draw a parallel line which will intersect the middle of the compass rose. Study the example. The compass reading that you should follow to sail from Milford Island to Chippewa Point (Course A) is 115° according to the inner magnetic circle of the compass rose.

What is the compass reading to sail from Chippewa Point to Cherry Island (Course B)? ________
Distance? ________ Travel time at 5 m.p.h.? ______

Now, for practice, chart your course on the example map from Perrique Island to Peck Island. Give the compass reading's distance and time that you have to follow and remember to stay out of shallow water.

Accuracy is important. If you are off by 5 degrees you run the risk of missing your destination entirely. If you don't know your travelling time you run the risk of grounding your boat on shoals or shore before you've seen your destination.

Problem:

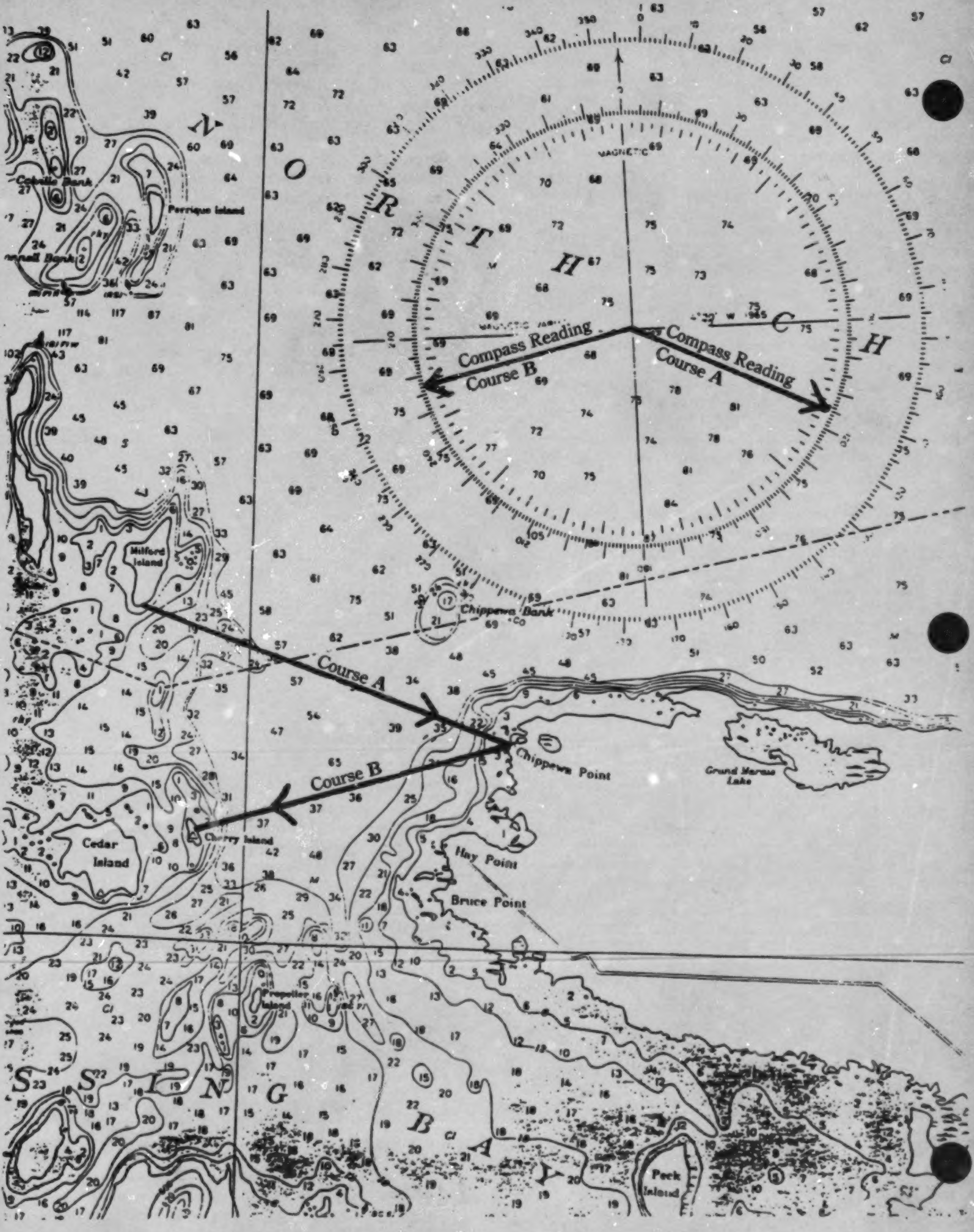
On the full navigational chart locate the compass roses and chart your course from Espanore Island to Old Fort St. Joe Point, Ontario. Stay out of the Lime Island Channel where you would have to compete with freighters for navigation room. Give the compass readings that you will have to follow:

____

____

____

____


NORTH CHANNEL
Compass Reading
Course B
Compass Reading
Course A
Course A
Course B
MAGNETIC
Chippewa Bank
Chippewa Point
Grand Marais Lake
Milford Island
Cedar Island
Cherry Island
Hay Point
Bruce Point
Propeller Island
Peck Island
Cobalt Bank
Perrique Island
SISING BAY

BEST COPY AVAILABLE

Activity 19: How The Great Lakes Modify The Growing Season

Using agricultural product and frost maps and an infrared satellite image, students develop a hypothesis about the effect of the lakes on growing seasons. They create a model to test it.

Grades: 4-8
Subject Areas: Science, Social Studies

If you've ever had the pleasure of going out to the back yard, plucking a fully ripe peach off a tree and sinking your teeth into its sweet succulent flesh, you probably lived in the south or in a few special areas of Michigan, Ohio or New York. Peaches are just one of several delicate, early-blooming southern fruits that can thrive in a narrow band of land (30 miles or 48 Km wide) along the south and east shores of Lakes Michigan, Erie and Ontario. Michigan, for example, produces 60% (six out of every 10 pounds or kilograms) of the cherries grown in the entire United States. That fruit belt also grows peaches, apples, pears, plums, grapes and berries in large quantities. A similar, much smaller cherry and apple growing belt is found in Wisconsin's Door County. Vineyards for wine grapes thrive in Ohio and Western New York state. How can these fragile "Southern Belles" survive the long cold northern winter? This exercise helps students answer that question.

Procedure

1. Copy and distribute table of first and last frost dates and the sketch maps of the Great Lakes basin showing types of farming areas and mean annual frost-free periods. Have students find the areas on the farming map which include fruit growing and color them with pencils. Have students find the areas with the longest frost-free period and color them with pencils as well. (Use different colors to show 160, 180 and 200 days frost free.) Show or distribute the infrared satellite image of the Great Lakes region attached to this activity. Explain that infrared energy can be detected with special sensors. The darker areas on the image are warmer, the lighter areas are colder. A few scattered clouds on the image are very cold and show pure white. (See Activity 17, "Astronaut's View of the Great Lakes," for an explanation of satellite mapping.)

2. Ask your students to propose reasons for the survival of fruit orchards in these narrow bands around the lakes. Work toward developing one or several hypotheses which would explain the information in these maps. Use the "If ________, then ________" formula. For example: If there are more days without frost over the lakes than inland, then the lakes must help keep the frost from forming. If the lakes are colder than the surrounding land in June, then the land must warm up faster than the lakes. If the last frost in the spring is about the same but the first frost in the fall is later in areas closer to the lake, the lake must delay the frost. If the lake is colder in June and warmer in September than the surrounding land, then the lake must change temperature more slowly than the surrounding land.

3. Ask students to develop a way of testing the hypotheses they have developed. Give students a list of available equipment and make sure they have access to the materials listed.

   2 thermometers (that can be submerged in water)
   2 plastic buckets
   ice
   water
   soil
   source of cold (like a refrigerator or outdoors in winter)

With this equipment students can construct experiments which show that water warms more slowly than air or that water cools more slowly than soil.

Examples: 1. Place one thermometer in a bucket with ice water. Suspend second thermometer in air above similar amount of ice in bucket without water Record temperatures at regular intervals.
2. Take equal amounts of room-temperature soil and water in plastic buckets. Place thermometers in them. Place in cool or cold location. Check temperature changes. (Watch out for freezing and broken thermometers if outdoor temperature is extremely cold.)

Help students to organize and evaluate their experiments by asking questions such as:
- How will we know a change is taking place?
- What parts of the experiment vary (are different from one another?)
- If more than one part varies, how will we know what has caused the change?

- What can we do to make sure only one element is different?
- What should we do with the information as we collect it?
- How can we make it understandable?

Discuss the difference between an observation and an inference. For instance, you *observe* that a peach is green, you *infer* that it's not ripe so you *decide* not to eat it. When testing the validity of a hypothesis, separating what you observe from conclusions you make about your observations is important.

4. After the experiment is completed, ask the students if their hypothesis has been confirmed or refuted. Using the model and the information in the maps, images and chart, ask students to develop an explanation for why peaches can grow in a narrow band of Michigan and Ohio lake shore area and in northern Alabama and Georgia, but not in the area in between. You may wish to have them do this in a brief written report or in group discussion.

5. Following is a brief explanation of how the lakes modify the growing season near them:

The waters of the lakes moderate the temperatures over the land along their edges. This means that in the winter the lakes are warmer than the air. As air passes over them it warms up and carries the warmth for about 30 miles (48 km). This warmer air keeps the fruit trees and plants from being frozen and killed by temperatures which drop far below zero. In spring the water stays cool longer than the air and land. Air passing over the lake cools off, and stays cool around the fruit area. This cooling slows the development of fruit blossoms. The trees and plants blossom later when there is less chance of damage by frost. In the late summer and early fall the warmed water of the lake again warms the air, protecting the mature fruit from damage by early frosts.

6. Students may have personal experience of another way lakes modify the temperatures near them: going to the beach in the summer. Temperatures are usually several degrees cooler at the edge of a lake than even a few hundred feet inland. Ask if any student noticed how much cooler than inland the lake shore is sometimes.

Taking It Further

1. Orchards are often placed in river basins or along chains of lakes. Locate any orchards in your area and discover if they are protected by being near water. Are they protected in any other way?

2. Check local nurseries for types of fruit trees available for your area. Study zone maps of the U.S. Department of Agriculture to see how temperatures vary from place to place in your state and region. (These maps are often printed in seed and nursery catalogs.) Plant a fruit tree at your school that is hardy for your area.

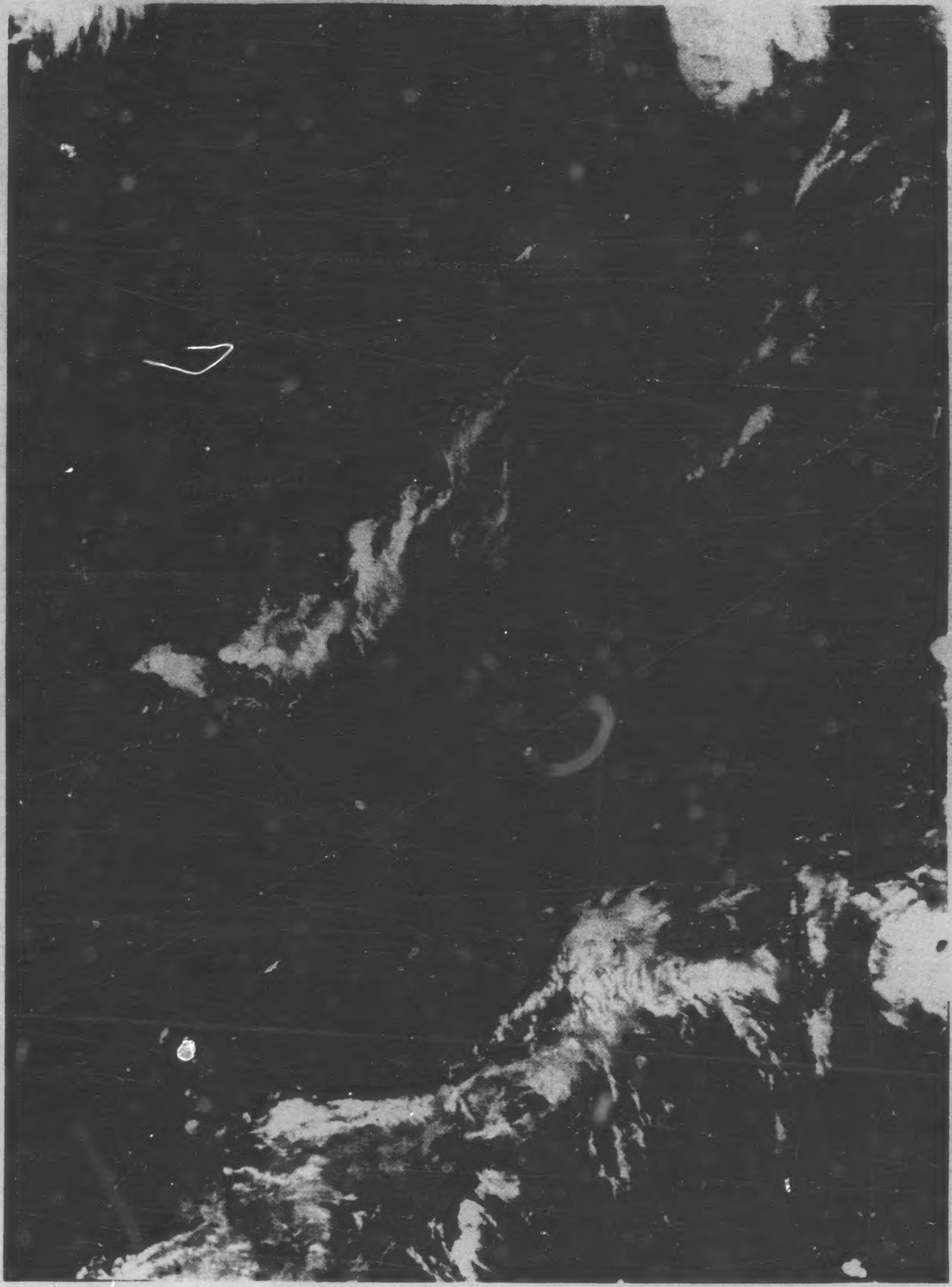
3. Check among family and friends. Does anybody know of a fruit tree surviving and/or bearing fruit outside of "its zone?" What elements can you discover that help protect it? Review the infrared map. Do cities show a darker color than surrounding areas? What does this indicate? How can that help fruit trees?

Duration of frost-free season and the average date of last and first frost, 1931-1960 for Walkerton andSouthhampton, Ontario

Station	Elevation (feet)	Distance from Lake Huron (miles)	Duration/days of frost-free season	Average date last frost	Average date first frost
Walkerton	800	30	129	May 19	Sept 26
Southampton	670	1	145	May 16	Oct 10

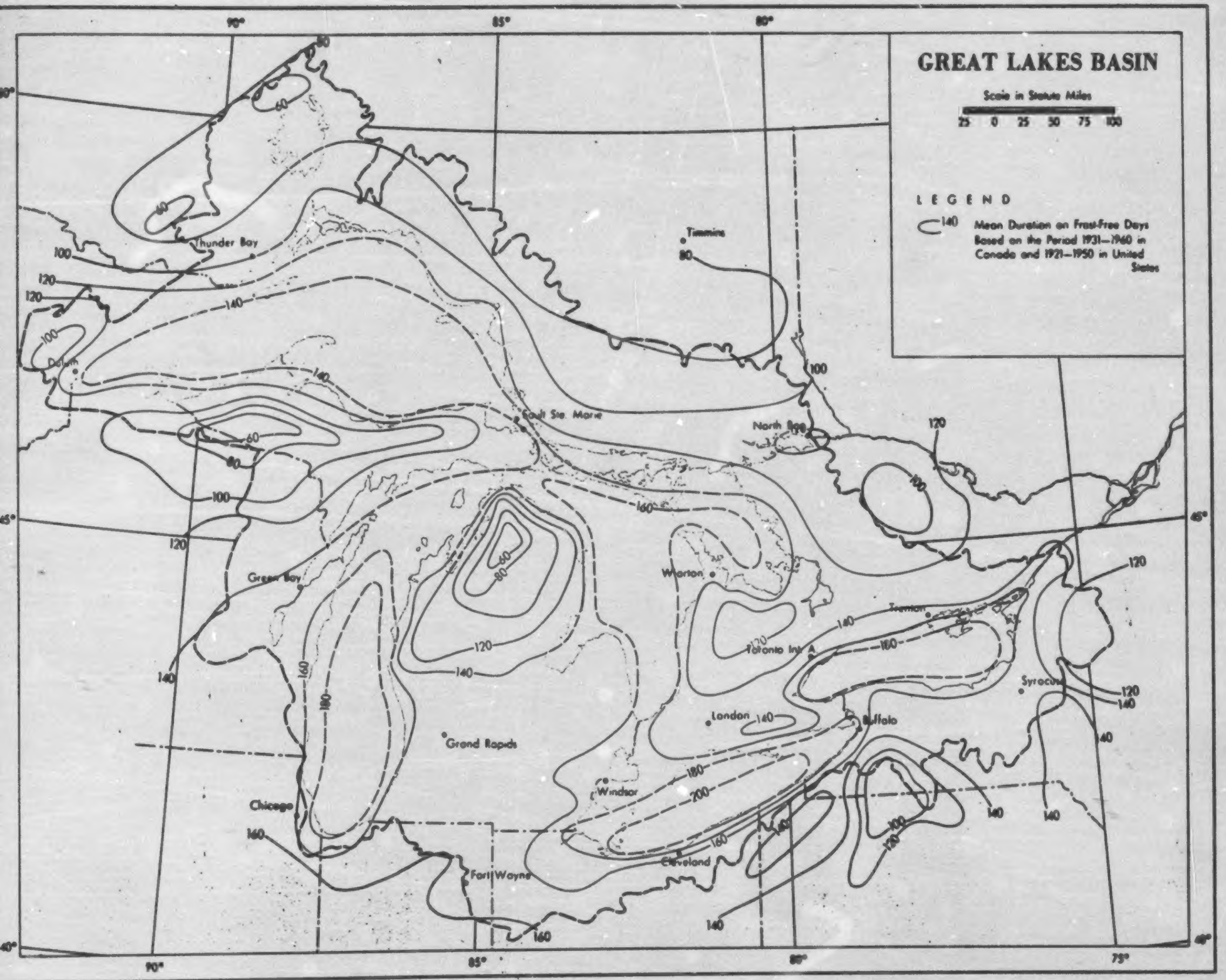
Source:

D.W. Phillips and J.A.W. McCulloch, *The Climate of the Great Lakes Basin*, Climatological Studies, Number 20, Environment Canada, Atmospheric Environment, Toronto, Canada, 1972, [U.D.C. 551.582 (713)], p. 13



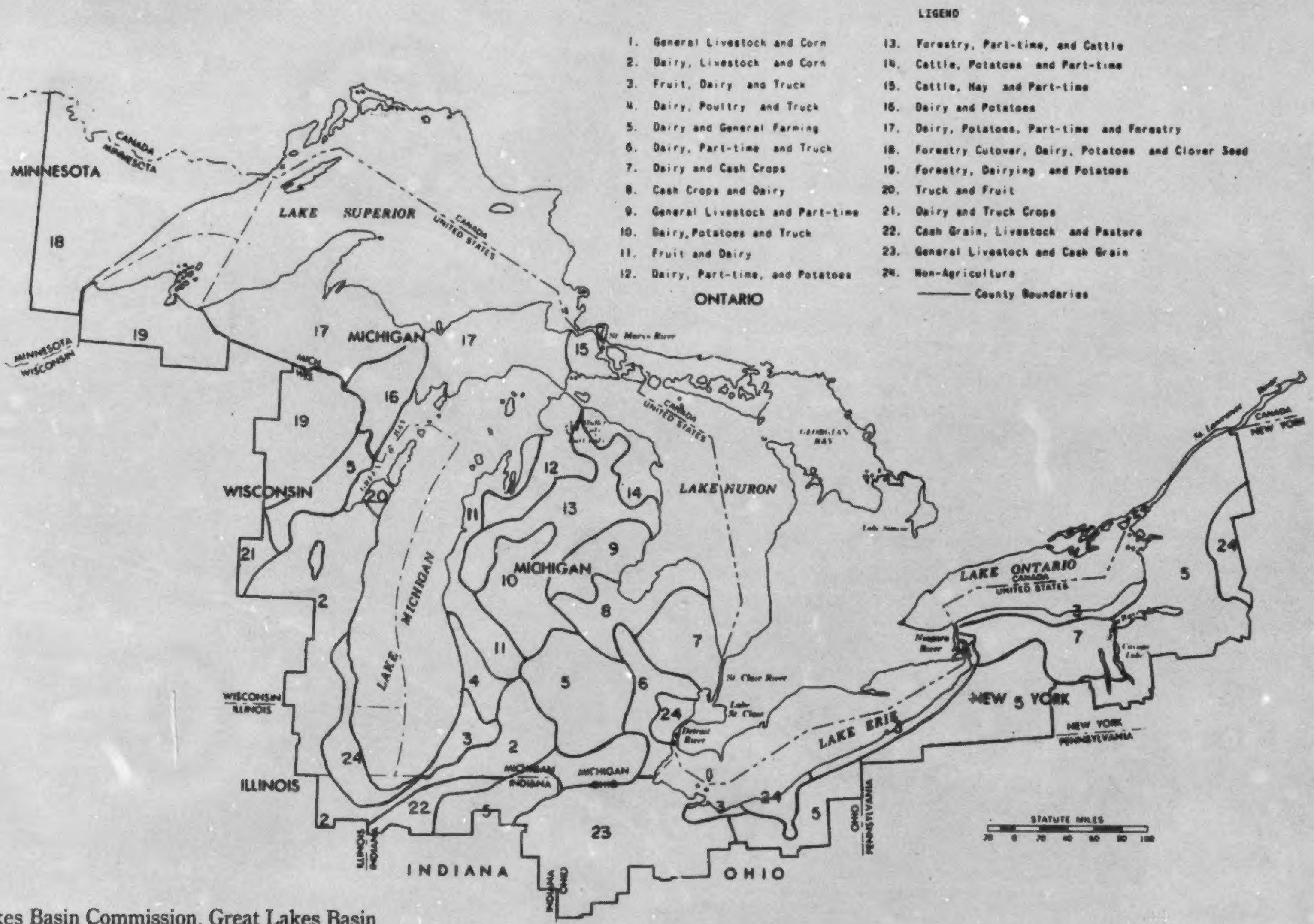
DMSP Satellite Image (infrared)—The Great lakes Region, June 16, 1980

Infrared images show warmer areas as darker, colder areas as lighter. Notice the high clouds which appear as bright white patches. In June the lakes are colder than the land and so appear lighter in the infrared image.


GREAT LAKES BASIN
Scale in Statute Miles
25 0 25 50 75 100
LEGEND
140 Mean Duration on Frost-Free Days Based on the Period 1931–1960 in Canada and 1921–1950 in United States
90°
85°
80°
75°
45°
40°
Thunder Bay
Duluth
Sault Ste. Marie
Timmins
North Bay
Green Bay
Wiarton
Toronto Int. A
Trenton
Syracuse
London
Buffalo
Grand Rapids
Windsor
Chicago
Cleveland
Fort Wayne
60
80
100
120
140
160
180
200

HART 19 – MEAN ANNUAL FROST-FREE PERIOD (DAYS). Along the lakeshore frost-free periods are 1 to 2 months longer in duration than inland. The frost-free season is longest, bout 200 days, along the south shore of Lake Erie. The shortest frost-free duration is found in upland areas away from the lakes, i.e. less than 80 days in the Menominee Range of northern ichigan and Wisconsin and in Ontario north and east of Lake Nipigon. Stations located in "frost hollows" can experience frost at any time during the year.

BEST COPY AVAILABLE


LEGEND
1. General Livestock and Corn
2. Dairy, Livestock and Corn
3. Fruit, Dairy and Truck
4. Dairy, Poultry and Truck
5. Dairy and General Farming
6. Dairy, Part-time and Truck
7. Dairy and Cash Crops
8. Cash Crops and Dairy
9. General Livestock and Part-time
10. Dairy, Potatoes and Truck
11. Fruit and Dairy
12. Dairy, Part-time, and Potatoes
13. Forestry, Part-time, and Cattle
14. Cattle, Potatoes and Part-time
15. Cattle, Hay and Part-time
16. Dairy and Potatoes
17. Dairy, Potatoes, Part-time and Forestry
18. Forestry Cutover, Dairy, Potatoes and Clover Seed
19. Forestry, Dairying and Potatoes
20. Truck and Fruit
21. Dairy and Truck Crops
22. Cash Grain, Livestock and Pasture
23. General Livestock and Cash Grain
24. Non-Agriculture
County Boundaries
ONTARIO
MINNESOTA
CANADA
MINNESOTA
LAKE SUPERIOR
CANADA
UNITED STATES
MICHIGAN
MINNESOTA
WISCONSIN
St Marys River
CANADA
UNITED STATES
LAKE HURON
WISCONSIN
LAKE MICHIGAN
MICHIGAN
St Lawrence River
CANADA
NEW YORK
LAKE ONTARIO
CANADA
UNITED STATES
Niagara River
St Clair River
Lake St Clair
Detroit River
WISCONSIN
ILLINOIS
LAKE ERIE
NEW YORK
NEW YORK
PENNSYLVANIA
ILLINOIS
MICHIGAN
INDIANA
MICHIGAN
OHIO
OHIO
PENNSYLVANIA
STATUTE MILES
INDIANA
OHIO
INDIANA
OHIO

TYPES OF FARMING

Source:

Great lakes Basin Commission, Great Lakes Basin Framework Study, Appendix 13, Land Use and Management, Public Information Office of the Great Lakes Basin Commission, Ann Arbor, Michigan, 1974, p. 27.

BEST COPY AVAILABLE

Activity 20: Snowmaking—Great Lakes Style

Students living near the Great Lakes often feel the chill of lake-effect snowstorms. Students who have been introduced to weather basics can become familiar with the lakes' effect on winter storms through this mapping exercise. This activity compliments a weather and climate unit.

Grades: 5-8
Subject Areas: Weather, Science, Social Studies

The Great Lakes create a weather pattern nearly unique in the world. Lake-effect snowstorms occur in only three places in the world: around the Great Lakes (see map of snow belts), the east shore of Hudson Bay in Canada, and along the west coast of the Japanese islands of Honshu and Hokkaido.

Snowbelts caused by the lakes have a profound effect on people. Winter sports like skiing and snowmobiling are major industries in the snow areas. Snow removal costs in the cities have a high impact on taxes. Heavy snows affect transportation, retail businesses and individual lifestyles.

Procedure

1. Locate a large map of the Great Lakes area to pin on a bulletin board or tape to a wall. Make enough copies of the snowfall and snowbelt maps included in this exercise so that individual students or groups of students can refer to them.

2. Review what students learned about air temperature cooling rates over land and water in Activity 19, "How the Great Lakes Modify the Growing Season." Ask the students for their ideas on how the temperature difference between land and water might affect lake- edge snowfalls.

3. Have students complete the snowbelt worksheet individually or as a group.

4. Tape strips of masking tape on the wall to represent each of the snow depths as they appear on the map. Mark the strips of tape 20", 40", 60", 80", 100", 120", 130", 160" (or the equivalent in metric) and place at the appropriate heights, using the ceiling if necessary. Then help students use their Great Lakes maps to label each level with the names of cities and towns whose average snowfall come under each level. Be sure to include your own area's average snowfall. (For the precise average contact the nearest weather service office or your provincial or state climatologist.)

5. Read or present the information on "Causes of Lake Effect Snowstorms" and "Clues for Predicting Lake-Effect Snowstorms" found on the following pages. Students should have some preliminary information on how weather systems form and move.

6. Have students complete the Snowstorm Forecaster Worksheet.

7. Discuss the worksheet and their answers.

8. Discuss the impact of heavy snowfalls on people who live in snowbelt communities. The following questions might help:

- What kinds of businesses profit from snowstorms?
- What kinds of businesses lose money because of snowstorms?
- What do you think might be the consequences of lake effect snowstorms caused by city and industry pollution?
- What kinds of food crops can be grown in snowbelt areas? (Consult a world atlas and agriculture resources maps for help with this one. North latitude will also have an effect.)
- What do you suppose the Indians and Fur Traders did when they lived in these snowbelt areas before snowplows, furnaces and international food transportation? Use your imagination or search for answers at the library.
- What kinds of things do you do in a snowstorm that are different from what you do on a sunny day in May?
- What is good weather? What is bad weather?
- What difference does it make when the weather is bad? Is go[illegible]
- Have you ever heard someone predicting the weather with a rhyme? (Like: "Red sky in the morning, sailors take warning. Red sky at night, sailors' delight.") What kinds of information do people use in predicting the weather? How would you find out which kinds of information are most helpful? Least helpful?

Taking It Further

1. Have your students collect daily weather maps showing the movements of fronts for one month. Discuss how forecasts may be made. Collect the daily high and low temperatures for lakeshore and inland cities for March and April and show them on a graph. (Daily newspapers are a good source for this information.)

2. Television reseachers have said that the local weather report on the 6 p.m. news is the most watched program of the entire day. Discuss this with your students and ask them to suggest reasons why this is so.

3. Ask students to list on the blackboard as many descriptive words for kinds of snow as they can think of. Compare this list to the list of Ojibway terms for weather below.* Discuss the differences and ask students to suggest why there are differences.

Mājizōgipon — It starts to snow.

Bīsipon — The falling snow is in fine, tiny flakes.

Nokāgonagā - The falling snow is in very large clusters of flakes.

Zhakāgonagā - The falling snow is soft.

Zhākipon - The falling snow is watery.

Bikokwābīsipon - The falling snow is in round balls.

Gawagonaga - Frozen ice pellets falling.

Bīwan - The falling snow is in flurries.

Madjipo - The falling snow is driven by the wind.

Bimipo - The snow is ending.

Ishkwāzōgipon - The snow is ended.

Each type of snow was associated with particular weather and conditions and could be used to predict the weather to follow. According to the Weather Almanac 1975 from which these terms are reproduced, probably the most competent meteorologist today could not out-forecast the Ojibwe of old, if both were forced to rely only on signs available locally.

Source:

*Bruce F. Watson, *Minnesota and Environs Weather Almanac,* Freshwater Biological Research Foundation, Navarre, MN, 1974, pp. 5-7.

Snowbelt Worksheet

Comparing the snowfall map and the snowbelt map of the Great Lakes to a map of the Great Lakes Region, answer the following questions:

1. Estimate the average snowfall in the following places:
Erie, Pennsylvania ______
Toronto, Ontario ______
Calumet, Michigan (Upper Penn.) ______
Peterborough, Ontario (N. of Lake Ontario) ______
Boonville, N.Y. (east end of Lake Ontario) ______
Mancelona, Michigan (east of Grand Traverse Bay) ______
Toledo, Ohio ______

2. Find your home town on the snowfall map and estimate the annual average snowfall ______

3. Using the snowbelt map, determine if your town falls within the lake-effect snowbelt? ___yes ___ no

Answers:

1. 60 in., 152 cm.
2. 60 in., 152 cm
3. 160 in., 406 cm
4. 60-80 in., 152-203 cm
5. 130-160 in., 330-406 cm
6. 120 in., 305 cm
7. 20-40 in., 51-102 cm

The Causes Of Lake-Effect Snowstorms

by Val Eichenlaub*

The period from mid-August to the first of March is the "unstable season" on the Great Lakes. During this season the mean (average) temperature of the land is lower (colder) than the mean temperature of the water. The largest differences between the two occur from mid-November to mid-January. The differences may average over 15° F (- 9° C) in the southern lakes and 30° F (-1° C) in the northern Lakes.

When northerly winds bring Arctic air down across the lakes the contrasts in temperature can become much greater, as much as 40° F (4° C) in the south and 50° F (10° C) in the north. Such large temperature differences are the source of "weather."

As the cold air streams across the warm lakes, it is warmed and becomes more humid. As the air warms, it becomes less dense and rises. As it rises it cools. Whenever moist air rises, clouds may form and precipitation may result. After the air passes for some distance over the lake, convection and turbulent exchange have transported the moisture aloft to form clouds. Then snow might fall. (Figure 41)

As the warmed air reaches the shoreline, additional lifting may occur as the air begins to "pile up." The friction of land is higher than that of water, so winds slow as they move over land. Where there are hills and high lands on the downwind shores of the lakes, air is forced upward, cooling it further and encouraging cloud formation and greater snowfall.

Usually the Arctic air necessary for large amounts of lake-effect snow to fall comes after a deep low pressure center (cyclone) has passed through or near the Great Lakes area. When the low moves through it opens the way for cold air to rush southward, usually in the form of a high-pressure area behind a cold front. Thus the snowfall usually occurs in conjunction with a rising barometer which measures air pressure.

Cities may influence lake-effect storms too. Even small cities are warmer than their surrounding areas. The air passing over large urban areas becomes warmed. This warmth may add to the heat acquired from the lakes and may occasionally provide a stimulus for development of lake-effect snowstorms.

Industries like steel mills may emit particles that act as ice-forming nuclei into the atmosphere. These may encourage snowstorms. The southern Great Lakes area is one of the world's leading centers for making iron and steel. Lead from automobile exhausts combines with the natural iodine in the air to form lead-iodine compounds. These may also make it possible for ice crystals to grow. You can see that the large urban areas along the shores of the Great Lakes may, at times, play a role in creating or intensifying downwind lake-effect snowstorms through the additional heat and ice-forming nuclei which they supply.

Source:

*Val L Eichenlaub, *Weather and Climate of the Great Lakes Region,* University of Notre Dame Press, Notre Dame, Indiana, 1979, pp. 145-153. (Adapted and quoted by permission.)

Clues For Predicting Lake-Effect Snowstorms

The following are necessary conditions for lake-effect snowstorms. "Necessary" means they all must be present for a storm to occur (except only one of 3 and 3A must be present).

1. **Large temperature difference between the lake and the air.** The greater the difference, the larger the potential for lake effect snow.

2. **High pressure cell (rising barometer) following a low pressure cell (falling barometer).** This situation provides favorable conditions for lifting the warm, moisture-filled air up for cooling and ice crystal formation.

3. **A long "fetch."** "Fetch" is the distance the wind travels over the open water surface. The longer the fetch, the greater the amount of heat and moisture which may be acquired from the lake. This results in a greater potential for lake effect snow. For examples:

   NW wind travels almost 130 miles (210 km) across Lake Superior, 150 miles (242 km) across Lake Huron, but only about 30 miles (48 km) across Lake Erie.

   WSW wind travels 30 miles (48 km) across Lake Michigan, 60 miles (97 km) across Lake Huron, and nearly 130 miles (210 km) across Lake Erie.

OR

3A. **A "fetch" which passes over large industrial areas.** The air receives additional heat and ice-forming nuclei from the particulate matter in smoke and exhaust.

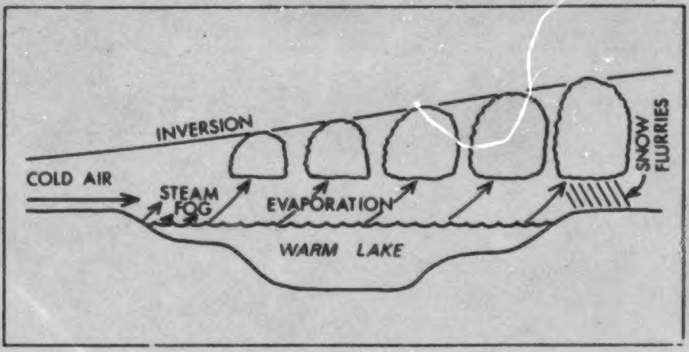

INVERSION
COLD AIR
STEAM FOG
EVAPORATION
SNOW FLURRIES
WARM LAKE

Figure 41 Modifications of Cold Air Crossing a Warm Lake

As the cold air streams across the warm Lakes, it is warmed and becomes more humid. As the air warms, it becomes less dense and tends to rise, cooling [as it rises]. Whenever moist air rises, as previously noted, clouds may form and precipitation may result. Fog results from the intense evaporation or transfer of moisture from the warm water to much colder air when the cold air initially makes contact with the warm water. After the air passes for some distance over the lake, convection and turbulent exchange have transported the acquired moisture aloft to form clouds, and snowfall may occur.

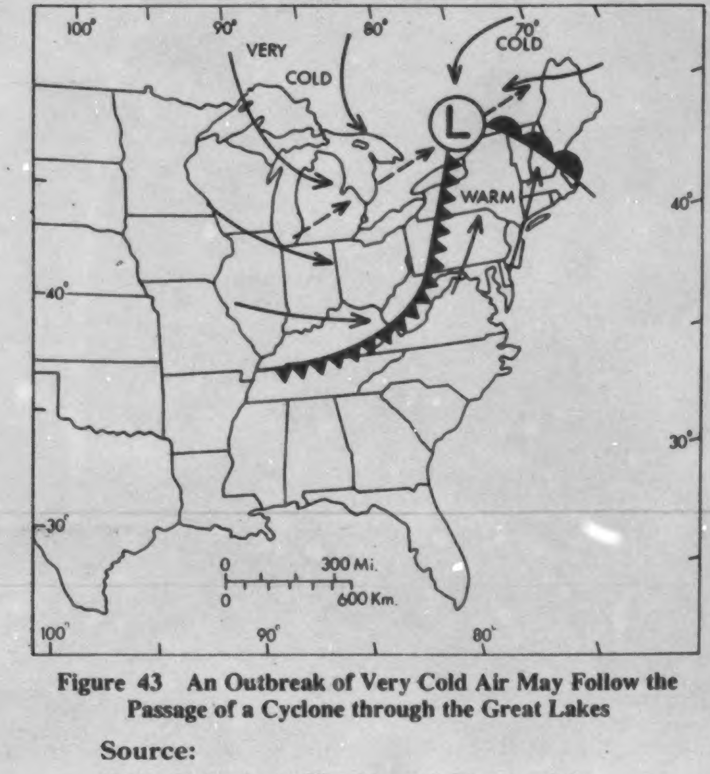
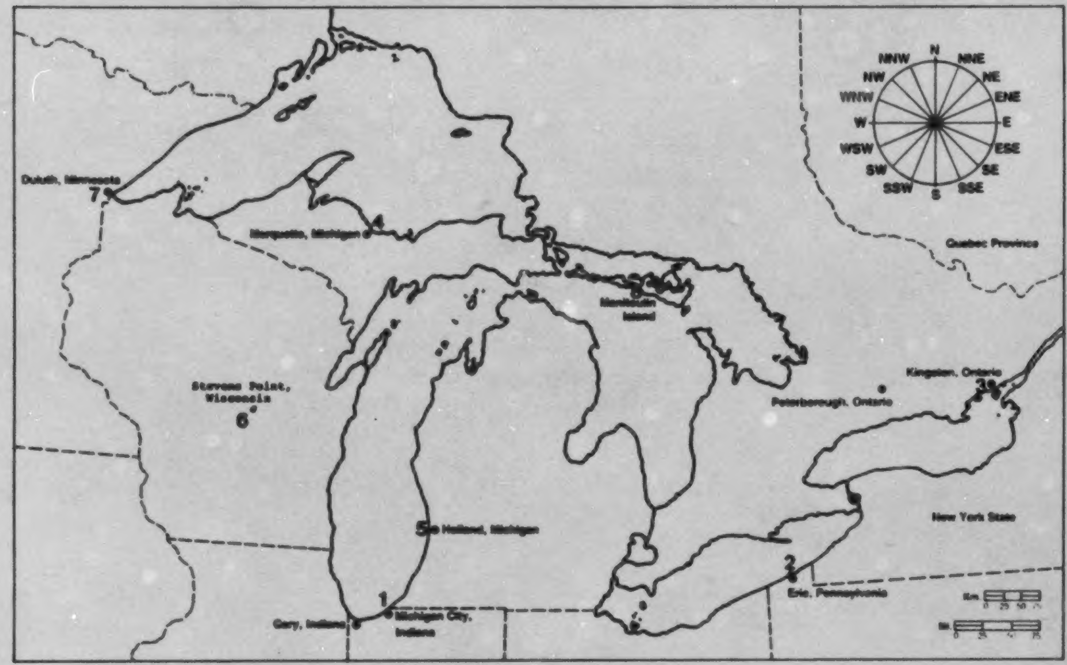

100°
90°
80°
70°
VERY COLD
COLD
L
WARM
40°
40°
30°
30°
0
300 Mi.
0
600 Km.
100°
90°
80°

Figure 43 An Outbreak of Very Cold Air May Follow the Passage of a Cyclone through the Great Lakes

Source:

Val L. Eichenlaub, Weather and Climate of the Great Lakes Region, University of Notre Dame Press, Notre Dame, Indiana, 1979, p. 148, p. 150. (Used by permission.)

Snowstorm Forecaster Worksheet


N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
Duluth, Minnesota
7
Marquette, Michigan
4
Manitoulin Island
Quebec Province
Stevens Point, Wisconsin
6
Kingston, Ontario
3
Peterborough, Ontario
New York State
5
Holland, Michigan
2
Erie, Pennsylvania
1
Gary, Indiana
Michigan City, Indiana
Km 0 25 50 75
Mi 0 25 50 75

Refer to the conditions for lake effect snowstorms and predict whether they will occur in the following situations. Give your evidence. (Hint: place a ruler on the compass line parallel to the wind direction given in the problem. Without changing its angle, slide it over until the ruler edge rests on the city given in the problem.)

1. You are in Michigan City, Indiana (1). The lake temperature is 33° F (.6° C). The air temperature is 2° F (-17° C). Winds are from the north at 12 mph (19 kmph). A low pressure cell has moved east into New York State. The barometer is rising. Is a lake effect snowstorm likely? ___yes ___no. Why or why not?

2. You are in Erie, Pennsylvania (2). The lake temperature is 33° F (.6° C). The air temperature is 30° F (-1° C). Winds are from the south, light and variable. A high pressure cell has just moved east into New Jersey. Barometer is steady. Is a lake effect snowstorm likely ___yes ___no. Why or why not?

3. You are in Kingston, Ontario (3). The lake temperature is 33° F (.6° C). The air temperature is 20° F (-7° C). Winds are from the Southwest, 9 mph (15 kmph). The barometer is falling and a low pressure cell is located just west of you over Peterborough, Ontario. Is a lake effect snowstorm likely? ___yes ___no. Why or why not?

4. You are at Marquette, Michigan (4). The lake temperature is 33° F (.6° C). The air temperature is - 10° F (-30° C). Winds are out of the north, 20 mph (32 kmph). The barometer is rising. Is a lake effect snowstorm likely? ___yes ___no.

Why or why not? Would you expect light, moderate or heavy snowfall? Why?

5. You are at Holland, Michigan (5). The lake temperature is 35° F (0° C). The air temperature is 12° F (-11° C). Winds are out of the southwest. They carry arctic air due to the position of a large high pressure cell over central Michigan. The winds pass over Gary, Indiana. The barometer is rising. Is a lake effect snowstorm likely?
___yes ___no Why or why not?

6. You are at Stevens Point, Wisconsin (6). The lake temperature is 32° F (0° C). The air temperature is 10° F (-12° C). Winds are out of the northwest at 8 mph (13 kmph). Barometer is rising. Is a lake effect snow storm likely? Why or why not.

7. You are at Duluth, Minnesota (7). The lake temperature is 32° F (0° C). The air temperature is -8° F (-31° C). The winds are out of the northwest at 18 mph (29 kmph). Barometer is steady. Is a lake effect snowstorm likely? ___yes ___no. Why or why not?

8. You are on Manitoulin Island. The lake temperature is 60° F (16° C). The air temperature is 75° F (24° C). Low pressure has just moved east over Quebec Province. High pressure is over Lake Michigan. Winds are from the west north west at 5 mph (8 kmph). Is a lake effect snowstorm likely? ___yes ___no. Why or why not?

9. Add a question using your own city or town.

Answers:

1. Yes. High temperature difference, rising barometer, long fetch.
2. No. Winds from the south would not cross a lake to reach Erie, Pa. The temperature range is too narrow.
3. No. Low pressure is west of Kingston. It must be east and followed by high pressure.
4. Yes. There is a very wide temperature difference and a long fetch. Expect heavy snow for the same reasons.
5. Yes. The fetch over the lake is not long but there is a fetch over the industrial area of Gary, Indiana. This adds heat and ice-forming nuclei to the air.
6. No. Stevens Point, Wisconsin, is not on a lake.
7. No. Winds don't pass over water to reach Duluth.
8. No. It's summer, silly!

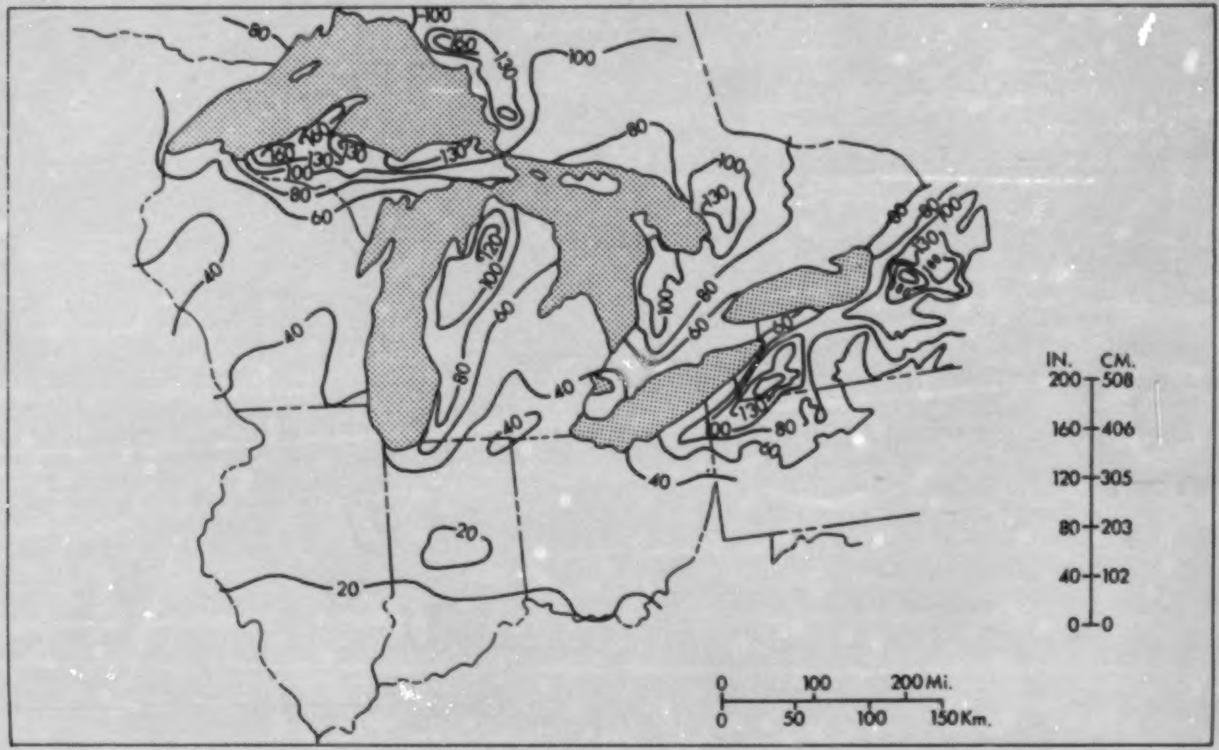
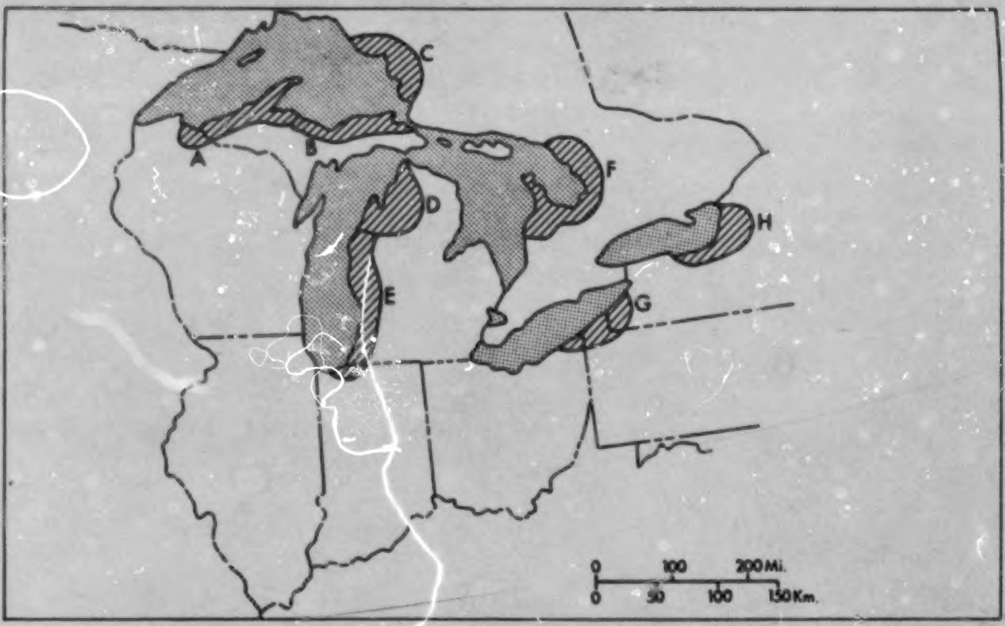


Figure 47 Mean Annual Snowfall in the Great Lakes Area (in inches)

Source:

Val L. Eichenlaub, Weather and Climate of the Great Lakes Region, University of Notre Dame Press, Notre Dame, Indiana, 1979, p. 162. (Used by permission.)



A. West Upper Peninsula—Keweenaw
B. East Upper Peninsula
C. Ontario—Lake Superior
D. Traverse Bay Upland
E. Western Lower Peninsula
F. Georgian Bay
G. Lake Erie
H. Lake Ontario

Figure 48 Snowbelts of the Great Lakes

Source:

Val L. Eichenlaub, Weather and Climate of the Great Lakes Region, University of Notre Dame Press, Notre Dame, Indiana, 1979, p. 165. (Used by permission.)

Activity 21: Math Path To The Great Lakes

Comparing lake statistics to familiar measurements helps students appreciate the size and magnitude of the Great Lakes.

Grades: 6-8
Subject Areas: Mathematics

Procedures

1. Have your students identify one or two buildings or other familiar tall structures (your school building, a flag pole, water tower, etc.) and estimate their heights. They can confirm their estimate on a sunny day by the following procedure:

> Take a stick and plant it in the ground near the building they are measuring. Measure the height of the stick and the length of the stick's shadow. Then measure the length of the building's shadow. The ratios of height to shadow will be the same.
>
> **EXAMPLE:** Building height ("x"): shadow (40 ft. or 12.2 m) :: stick (18 in. or 5.5 cm) : shadow (12 in. or 3.7 cm)
> If the ratio of the height of the stick to its shadow is 1 1/2 to 1 (18 "divided by 12" or 5.5 cm divided by 3.7 cm), then the same ratio will apply to the building, making the building 60 ft. tall (1 1/2 x 40') or 18.3 m tall (1 1/2 x 12.2)

A second way of estimating building height is with a stick and a person. Measure one student. Have the student stand next to the building. The person doing the measuring stands back and holds the stick upright in her outstretched hand. Using her thumb, she marks off a portion of the stick which is the same size as the person. Now she moves the stick up counting how many times the measured part of the stick appears to fit between the base and the top of the building. To find the building height multiply that number by the height of the student. It may be fun to have all the students estimate the height of the building in pairs. Compare their answers and develop an average estimate of the building's height.

2. Depending on the skills of your students and the availability of calculators, select some of the facts about the Great Lakes included at the end of this activity and other measurements you have developed and create story problems for them to solve. Alternatively, you may want to provide your students with the data and some simple formulas and ask them to work in teams to make up a set of problems in which the formulas are applied. Then ask them to explain how they went about the task.

Here are several example story problems:

A. How high is your school building? (Figure 15 feet or 5m per story x number of floors in the building, or use one of the estimating methods given above.) ________

B. How many school buildings stacked on top of each other would fit in Lake Erie's deepest spot?
(Example: 210 ft - 30 ft. = 7) ________
Lake Superior's deepest spot? ________

C. If you had a boat that could travel 10 miles an hour how long would it take you to travel:

The length of Lake Erie?	(24.1 hrs.)
The width of Lake Michigan?	(11.8 hrs.)
The length of Lake Superior?	(35 hrs.)

D. You are a marathon runner training for the next Olympics. You run about 20 miles [32 Km] a day in practice. How many days does it take you to run:

Around Lake Huron?	(159 days)
Around Lake Erie?	(42.8 days)
Around Lake Michigan?	(83 days)

E. You set out to run around Lake Ontario on May 5th. On what date will you complete your trip?

____

$$\frac{726\text{ mi}}{(20\text{ miles/day})} = (36.3\text{ days}) = \text{June 11th; or}$$

$$\frac{1168\text{ km}}{(32\text{ km/day})} = (36.5\text{ days}) = \text{June 11th}$$

F. Measure all the students in your class to the shoulder. Round your measurement to the nearest 1/2 foot (10 centimeters). If all of you could stand in one stack on each other's shoulders, would the one on top be able to peek out of the deepest part of:

Lake Erie? ________
Lake Huron? ________

G. If all the water in Lake Superior were to cover Wisconsin, but stay within its borders, how deep would the water be?

Formula = vol. of lake as cu. mi.
area of state as sq. mi.
2935 cu. mi. x 5280 ft. mile = 276 ft
56154 sq. mi.
OR
Vol. of lake as cu km.
area of state as sq. km.
11,910 cu km. = .082 km - 82 m
145,439 sq. mi

H. What is the height of the tallest building in your state? (or your school building) ________ How much of that building would be underwater if the nearest Great Lake covered your state? (or your school?) Here are some sample depths using the formula given in G.:

Lake Superior covers= 184.3 ft.
Minnesota (56.2 m)
Lake Superior covers= 37.5 ft.
Ontario (11.4 m)
Lake Michigan covers= 110.5 ft.
Illinois (33.7 m)
Lakes Michigan and= 184 ft.
Huron cover Michigan (56.1 m)
Lake Michigan covers= 171.7 ft.
Indiana (52.4 m)
Lake Erie covers Ohio = 24.8 ft.
(7.6 m)
Lake Ontario covers New= 41.9 ft.
York (12.8 m)

I. What is the total volume of water in all of the Great Lakes?

Lake Erie	116 cu. mi.	483 cu km
Lake Huron	849	3536
Lake Michigan	1180	4915
Lake Ontario	393	1637
Lake Superior	2935	11910
	5473 cu. mi.	22,481 cu km

J. What is the total area of the 8 states and 1 province which border the Lakes?

Ontario	412,582 sq. mi.	1,068.588 sq km
Minnesota	84,068	217,736
Wisconsin	56,154	145,439
Illinois	56,400	146,076
Michigan	58,216	150,780
Indiana	36,291	93,994
Ohio	41,222	106,765
Pennsylvania	45,333	117,413
New York	59,576	128,402
	839,842 sq. mi.	2,175,193 sq km

K. If all the water in the Lakes covered all the states and provinces in the region, how deep would the water be?

(34.4 ft or 10.3 m)

Lake Facts

Lake Erie:

Length:	241 mi (387 km)
Breadth:	57 mi (27 km)
Depth:	62 ft (18 m) average, 210 ft (64 m) max
Volume:	116 cu mi (483 cu km)
Water Surface:	9910 sp mi (25,666 sq km)
Shoreline Length:*	856 mi (1377 Km)

Lake Huron:

Length:	205 mi (331 km)
Breadth:	183 mi (294 km)
Depth:	195 ft (59 m) average, 750 ft (228 m) max
Volume:	849 cu mi, 3536 cu km
Water Surface:	23,000 sp mi (59.570 sq mi)
Shoreline Length:*	3,180 (5,116 km)

Lake Michigan:

Length:	307 mi (493 km)
Breadth:	118 mi (189 km)
Depth:	279 ft (85 m) average, 923 ft. (280 m) max
Volume:	1,180 cu mi (4,915 cu km)
Water Surface:	22,300 sq mi (57.757 sq km)
Shoreline Length:*	1,660 mi (2,670 km)

Lake Ontario:

Length:	193 mi (310 km)
Breadth:	53 mi (85 km)
Depth:	283 ft (86 m) average, 802 ft (243 m) max
Volume:	393 cu mi (1,637 cu km)
Water Surface:	7,340 sq mi (19,010 sq km)
Shoreline Length:*	726 mi (1,168 km)

Lake Superior:

Length:	350 mi (563 km)
Breadth:	160 mi (257 km)
Depth:	489 ft (148 m) average, 1,333 ft (405 m) max
Volume:	2,935 cu mi (11,910 cu km)
Water Surface:	31,700 sq mi (81,103 sq km)
Shoreline Length:*	2,980 mi (4,798 km)

* includes islands

Facts About Bordering States And Provinces

Ontario

Area:	412,582 sq mi (1,068,588 sq. km.)
Highest Pt:	2,183 ft—Ogidaki Mtn. (666 m.)

Minnesota

Area:	84,068 sq mi (217,736 sq. km.)
Highest Pt:	2,301 ft—Eagle Mtn. (702 m.)

Wisconsin

Area:	56,154 sq mi (145,439 sq. km.)
Highest Pt:	1,952 ft—Timms Hill (595 m.) (west of Tomahawk)

Illinois

Area:	56,400 sq mi(146,076 sq. km.)
Highest Pt.:	1,235 ft—Charles Mound (377 m.)

Michigan

Area:	58,216 sq mi (150,770 sq. km.)
Highest Pt.:	1,980 ft—Mt. Curwood (U.P.) (604 m)

Indiana

Area:	36,291 sq mi (93,994 sq. km.)
Highest Pt.:	1,257 ft—Wayne County (383 m.)

Ohio

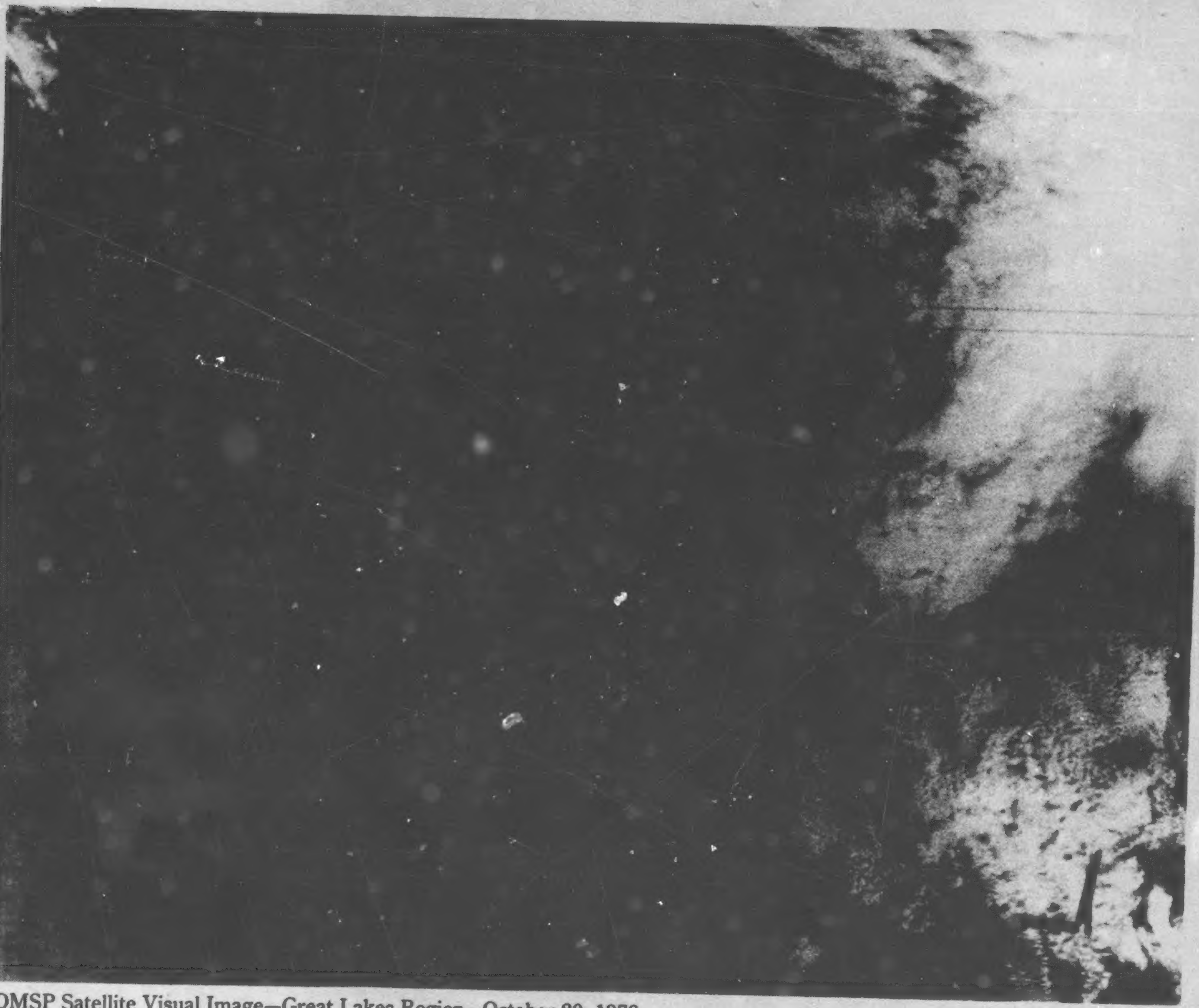
Area:	41,222 sq mi (106,765 sq. km.)
Highest Pt.:	1,550 ft—Campbell Hill (473 m.) (near Bellfontains in E.C. Ohio)

Pennsylvania

Area:	45,333 sq mi (117,413 sq. km.)
Highest Pt.:	3,213 ft—Mt. Davis (980 m.) (west end of Md. Border)

New York

Area:	49,576 sq mi (128,402 sq. km.)
Highest Pt.:	5,344 ft—Mt. Marcy (1,630 m.) (Adirondack Mt.—East Edge)



DMSP Satellite Visual Image—Great Lakes Region—October 20, 1978

Activity 22: The Great Lakes Shipping Game

More than 100 million tons of cargo travel through the Great Lakes every year. Shipping on the Lakes has been essential to manufacturing and trade for more than 300 years, since birchbark canoes carried furs. The simple board game in this activity provides students with insight into the life of cargo carriers on the Great Lakes.

Grades: 6-8
Subject Areas: Social Studies (Economics), Math, Geography

The Great Lakes Shipping Game and other information included in this activity are designed to help students become acquainted with the transportation of goods on the lakes. Students learn to identify typical cargoes, ship types and navigation hazards. They also learn to estimate transport times and costs.

Procedure

1. Before turning your students loose to play the shipping game, browse through the resources at the end of this activity. The history of shipping on the lakes is full of adventures. The books by Barry, Boyer and Bowen have many stories which could be read aloud. The first chapter of *The Great Lakes* by Barry, which traces a freighter's trip from Duluth to the Atlantic Ocean, may be particularly helpful.

2. Invite students to discuss shipping on the lakes and predict the kinds of products which might be shipped. Ask the following questions to keep discussion going:

   A. If shipping on the lakes is slower but less expensive than transporting goods by truck or rail, what kinds of things do you think might be sent by ship?

   B. If you were in charge of transporting products (a job known as "freight forwarding," what kinds of products would you *not* want to send by ship?

   C. Introduce the three main types of freight-carrying ships found on the lakes using the silhouettes included. (tanker, self-unloading laker and self-unloading super laker). Bulkers are included in this activity; however, most are being converted to self-unloaders. Ask your students if they can add anything to the list of products already developed in question A.

   D. How is your life affected by the products shipped on the lakes?

3. Since students will need to calculate their shipping budget, review math techniques for adding 3 and 4 digit numbers and for finding net change (subtract smaller from the larger). You may wish to use one shipping assignment and one budget sheet as a math story problem. You can also hand out general information sheets on distances and ports, allowing students to make up and solve their own story problems about shipping on the Great Lakes, or to create new shipping orders for the game.

4. Set up the Shipping Game. You will need the following supplies:

   3 X 5 cards- heavy-duty posterboard or
   masonite 32" X 40" (81 cm. x 102 cm.)
   glue
   stones or other items for tokens
   1 standard die
   clear adhesive-backed plastic (optional)

You will need to make photocopies of the gameboard, situation cards, rules, shipping orders and budget sheets. Details of how to assemble the game are found in "To Set up Shipping Game". Some of your students may enjoy helping to assemble the gameboard and enhancing it with colors and other decorations.

5. Supervise students playing the game or play it with them. One game uses one shipping order. Some shipping orders are simpler than others and may be good for the first round. They are numbered according to level of difficulty, #1 being the easiest.

6. Have students keep track of their decisions and results while playing the game. After completing the game, have students evaluate their best and most foolish decisions. What would they do differently next time? Why? Is strategy important in this

game? Have students play the game with a specific strategy and compare the outcome to the first time they played.

7. Suggest other activities including drawing pictures of freighters, making up stories based on some of the situation cards, or making up new shipping orders. Some of the major ports on the Great Lakes and the most common commodities shipped into and out of them should be included.

8. After all students have played the game or solved the math problems for each shipping order, you could use the "Shipping Game Worksheet" as an oral or written quiz.

9. You may also want to lead a group discussion about shipping in the Great Lakes. Encourage discussion with questions such as:

A. A truck on a highway can travel 50 mph (83 kmph) and a ship on the lakes can travel 10 mph (17 kmph). Why do you think shippers used ships for cargoes like grain, coal, and iron ore instead of trucks?

B. If Canada and the United States were being settled today with all the technology we now have but without roads, railroads, etc., do you think the lakes would be used for shipping? What are the reasons for your answer? How would the availability of fuel influence your answer?

C. What are the advantages and disadvantages of using the Self-Unloader *Stewart J. Cort?*

D. Why do some ships travel empty half of the time? Is this a problem? If this is a problem, what do you suggest? If that didn't work, then what?

Taking It Further

1. "Shipping on the Great Lakes" and "Shipping: The World Commuters" are two simple shipping activities that may help students understand the cost differences between rail and water shipment. They are available from the Ohio Sea Grant Program at a cost of $1.00 per activity plus $1.00 for postage and handling. Contact:

   Ohio Sea Grant 283 Arps Hall 1945 N. High
   St. Columbus, Ohio 43210

2. Write to any of the following for supplemental information on shipping on the Great Lakes:

   A. Dominion Marine Association 350 Sparks
   St. Suite 703Ottawa, Ontario, Canada K1R-788

   Ask for a copy of its annual report. It is written in simple language and explains each type of cargo carried by ships owned by companies in Canada, 80% of whom belong to this association.

   B. Saint Lawrence Seaway Development Corporation Public Information Officer P.O. Box
   520 Massena, New York, 13622

   Ask for a copy of: *The Saint Lawrence Seaway*, put out by the U.S. Department of Transportation. It explains how the locks in the Welland Canal and St. Lawrence Seaway work.

3. Have students write to the owners of the ships in this game (owners' addresses are in Greenwood's guide) and ask for photos and other information about the ships.

Sources:

Books

Annual Report, Dominion Marine Association, Ottawa, Ontario, December, 1982.

John O. Greenwood, *Greenwood's Guide to Great Lakes Shipping,* Freshwater Press, Inc., Cleveland, Ohio, 1982.

Jacques Lestrang, *Lake Carriers, The Saga of the Great Lakes Fleet—North America's Fresh Water Merchant Marine,* Superior Publishing Company, Seattle, Washington, 1977.

St. Lawrence Seaway Development Corp., *The St. Lawrence Seaway,* USDOT, Massena N.Y., 1981.

Map

Great Lakes from Lake Champlain to Lake of the Woods. Chart No. 14500. Cost $5.00, but may vary at local sources. This chart can be obtained from the Distribution Division, (OA/C44), National Ocean Survey, Riverdale, Maryland 20737, telephone (301) 436-6990 (Counter Sales: 6501 Lafayette Ave., Riverdale, Md., or Lobby, Building 1, 6001 Executive Blvd., Rockville, Md., - 439 West York St., Norfolk, Va.) or from authorized sales agents. Orders mailed to Riverdale, Maryland, should be accompanied by a check or money order payable to NOS, Department of Commerce. Remittance from outside of the United States should be made either by an International Money Order or by a check payable on a United States Bank.

You can also check for a regional distributor of nautical charts published by the National Oceanic and Atmospheric Administration (NOAA), Washington, D.C.

Resources:

Books

Barry, James P., *The Great Lakes,* Franklin Watts Inc., New York, 1976. (grades 4-8). Beginning at Duluth, Minnesota, the freighter *Red Wing* carries a cargo of grain through Lakes Superior, Huron, Erie and Ontario to the Atlantic seabord. The function of the navigational locks between lakes is described.

Following chapters deal with the glacial formations, geology and mineral deposits, history, Indian tribes, recreation and industry of the area. The last chapter tells of pollution that threatens the lakes. A well- organized source of general information written with clarity and illustrated with well-chosen photographs. Index. A First Book.

Boyer, Dwight., *Great Stories of the Great Lakes,* illustrated, Dodd, Mead and Co., New York, 1966. (grades 6-). Boyer, an expert story-teller, relates 14 true tales of Great Lakes ships and men who battled storms, severe weather, accidents and disasters to keep cargo and people afloat. Tragedy, humor and heroism dot the well-documented text which is illustrated by 8 pages of photographs and maps. Bibliography and index.

Boyer, Dwight., *True Tales of the Great Lakes,* illustated. Dodd, Mead and Co., New York, 1971. (grades 6-). More strange stories of accidents that defy explanation, lost ships that dropped out of sight, thievery and deception, and gallantry in heroic salvages and rescues. Six of the thirteen stories concern the "Big Blow" of 1913, a four-day weather convulsion, in which twelve ships and their crews numbering about three hundred sailors were lost on Lakes Superior, Huron, Michigan, and Erie. A well- organized, documented collection told with authority and vitality. There are 14 pages of photographs.

Zim, Herbert, *Cargo Ships,* William Morrow & Co., Inc., N.Y., 1970. Most of our commercial trade is carried on by freighters, tankers, and bulk carriers, the great cargo ships about which this book is written. The layout of a ship, the kinds of ships (including a Great Lakes ore carrier), how a ship floats, terminology, the parts of the ship, how the engines work, the equipment on the ship, the different kinds of cargo, how cargo is loaded and unloaded, jobs on a ship - all are covered in this informative book. Although an index is provided, the format would have been improved by the addition of subtitles. This is a very useful, readable book illustrated with finely-done black and white drawings.

Films

"Great Lakes - Highway of Commerce," 22 min., Color, Encyclopedia Britannica Films, 1951. Depicts the Great Lakes' importance in transporting pulp lumber, grain, coal, limestone and iron ore deposits. Uses animated maps to indicate deposits and transport routes. Describes loading and unloading cargo. Visits the operation of the Sault Ste. Marie locks. (Intermediate, junior high, high school)

"Great Lakes: North America's Inland Seas", 17 min., Color, Encyclopedia Britannica Films, 1971. Acquaints the viewer with the type of shipping that is done on the Great Lakes. Shows what commercial activities in the region are served by the lakes. Sketches the early development of interlake transportation and the eventual opening of the St. Lawrence Seaway. (Intermediate, Junior High, High School)

"Story of the St. Lawrence Seaway," 13 min., color, McGraw-Hill, 1959. Describes the development and operation of the St. Lawrence Seaway. Uses animated drawings to depict the past, maps to show the extent of the system, and documentary footage to highlight its construction. Emphasizes the importance of this water transport route to Canada and the United States. Shows the inland system of locks and canals. (Junior high and high school)

Filmstrips:

"Minnesota's World Port," 15 min., Color, Upper Midwest Film-strips. The movement of ocean vessels on the Great Lakes has had a profound effect on this state's only ocean port. We detail what happens from the time a foreign ship arrives until it departs with its cargo.

Additional Ports

PORTS:	COMMODITY:	LOADING (L) OR UNLOADING (U)
Duluth, MN 394 mi. (635 Km) to Sault Ste. Marie	Liquid fats and oils	L
	Ore	L (3500 tons/hour)
	Coal	U (self-unloaders Only)
	Grain	U
Marquette, MI 159 mi. (257 Km) to Sault Ste. Marie	Ore	L (3100 tons/hr)
	Coal	U (self-unloaders only)
	Fuel Oil and Gasoline	U
Milwaukee WI 259 mi. (418 Km) to Mackinac 85 mi. (137 Km) to Chicago	Liquid Fats and Oils	L and U
	Petroleum Products	L and U
	Coal	U (self-unloaders only)
	Grain	L (22,000 tons/hr) U (10,500 tons/hr)
Chicago, Ill 324 mi. (523 Km) to Mackinac	Grain	L (20,000-50,000 tons/hr)
	Ore	U (10,000 tons/hr) U (150-2000 tons/hr)
	Salt, Cement, Paper	U (self-unloaders only)
Detroit, MI 336 mi. (542 Km) to Mackinac 54 mi. (87 Km) to Toledo	Petroleum Products	L and U
	Salt, Stone, Cement	L and U (mostly self-unloader)
	Coal	U (self-unloader only)
	Ore	U (500-1400 tons/hr)
Buffalo, NY 261 mi. (421 Km) to Detroit 22 mi. (35 Km) to Port Colborne	Ore	U (self-unloaders only)
	Scrap Steel	L and U (100 tons/hr)
	Salt	
	Sand	U (self-unloaders only)
	#6 fuel oil	U

(For other ports and the commodities they handle, consult *Greenwood's Guide to Great Lakes Shipping*).

Shipping Game Worksheet

After you have played all the shipping orders in the shipping game, answer the following questions:

1. Name one port where a ship can load up with fuel oil.

____

2. What two bulk cargoes are commonly loaded at Thunder Bay, Ontario?

____

____

3. What are two uses for coal shipped on the Great Lakes?

____

____

4. Name the three locations where locks help ships adjust to different water levels.

____

____

____

5. If the distance from Thunder Bay, Ontario, to Montreal is 1200 miles (1935 km) and you can travel 15 miles per hour (24 kmph) in a ship, how many days of continuous travel does it take to make the trip? (show your work)

6. What are some major benefits and disadvantages of Great Lakes shipping compared to land transportation?

BENEFITS:	DISADVANTAGES:
________________	________________
________________	________________
________________	________________
________________	________________

7. In your own words, describe the difference between a bulker and a self-unloader.

8. Trace the path of a bushel of wheat from the plains of Saskatchewan to a loaf of bread in a kitchen in Liverpool, England. Tell the kind of transportation used, the types of people who handle it, and any processes which change it.

Quiz answers:

1. Detroit
2. grain and iron ore pellets
3. electricity generation and steel-making
4. Sault Ste. Marie, Welland Canal, St. Lawrence Seaway
5. three and a third days
6. Benefits:
    A. Can move large amounts of bulky or heavy cargo at one time.
    B. Less fuel is required than land transportation.
    C. Lake shipping is less expensive
    Disadvantages:
    A. Slower than rail or truck
    B. Weather is a significant factor
    C. Shuts down 3-4 months a year because of ice in lakes
    D. Limited number of pick up and unloading points.
    E. Inefficient for nonbulk cargo because of high handling costs.
7. A bulker has no equipment for unloading itself. It carries bulk cargoes like grain, coal, iron ore, salt, etc. It is generally older and smaller than a self-unloader. A self-unloader has equipment on board to unload its own cargo. It also carries bulk cargoes and is generally newer and bigger than a bulker.

8. Farmer harvests, carries in farm wagon. Truck to grain elevator in nearest rail depot (elevator operator handles it). Loaded into train (again elevator operator). Train goes to Thunder Bay. Unloaded at port (new elevator operator). Loaded onto ship (elevator operator and seamen). Travels from Thunder Bay through the Lakes to Montreal. Unloaded into grain elevator (elevator operator). Reloaded into ocean-going ship (elevator operators, seamen). Travels out St. Lawrence River, across Atlantic Ocean, to port of Liverpool, England. Unloaded at port to grain elevator (seamen and elevator operators). Loaded into lorry (truck in England) by grain elevator operator. Driven by truck driver to flour mill. Ground, sifted and bleached into flour by mill employees. Sacked and loaded into truck for trip to bakery. Unloaded by trucker. Made into bread by bakery employees. Packaged and trucked to store. Bought and transported home in car by homeowner.

To Set Up Shipping Game

1. Copy shipping orders, budget sheets, situation *cards, rules of the game and game* board sheets. Each sheet is marked with number of copies needed.

2. Glue or paste situations to standard 3X5 cards.

3. *Assembling the Game Board.* When the 8 map sections are assembled they show the entire Great Lakes region. Copy these map sections and arrange them by number on a 32" by 40" (81 cm. x 102 cm.) piece of heavy-duty poster board (available at art supply stores) or 1 or 2 pieces of masonite. Your students might enjoy coloring the lakes light blue to distinguish them from the land. Cover map board and situation cards with clear adhesive plastic or laminate them for durability. Students can also gain geography and map reading experience by assembling the game board for you. You will find it helpful to have a map of the Great Lakes region available for reference. The wall-sized chart called "The Great Lakes From Lake Champlain to Lake of the Woods" may be helpful for this and many other activities in this group. (See Sources at end of activity for ordering the chart.)

4. Collect stones, coins, tiddlywinks or other small objects for tokens, one for each player. Students may enjoy making small cardboard tokens in the shapes of freighters. (Refer to silhouettes.)

5. Find a standard die to throw for board moves.

Rules of Play For The Great Lakes Shipping Game

Object of the Game:
The object of the game is to be the first ship to reach the final destination on the shipping orders *and* to show the lowest actual budget for the trip. All players use the same shipping order for one game. Four shipping orders are available. They vary in difficulty and are numbered, 1 being the easiest and 4 the hardest.

Winner:
The winner is the player who arrives earliest at the final port destination with an actual budget closest to or below the projected budget.

Start:
Each player throws the die once. The player with the highest number on the die goes first. Play moves to the left.

Play:
Each player in turn throws the die and moves a token or marker the number of spaces on the gameboard indicated by the number of spots on the die. Players must follow the standard shipping route marked in the lakes, counting each square through which the route travels as one. Players follow route in shipping instructions.

Two or more tokens may occupy the same space.

Ships (tokens) going the same direction may not pass each other in the Soo Locks, Welland Canal or St. Lawrence Seaway.

When a player's token lands on a square marked with a star (*), the player draws a Situation Card and follows the instructions on the card.

Each gain or loss of time from Situation Cards or lock passage must be recorded on the Shipping Budget.

Locks and Canals:
The locks at Sault Ste. Marie, the Welland Canal and the St. Lawrence Seaway hold one ship at at time. (There are two locks for each direction at the Soo.) Ships going opposite directions can pass each other in paired locks. But ships going the same direction cannot overtake and pass each other in these areas.
When the locks are already occupied by a token, each player behind that token may move as many of the number thrown on the die as will bring him/her into the lock. The number of spots remaining on the die become hours of lost time. (For example: You throw a 5. You can move 3 spaces to join the player ahead of you in the Welland Canal. 2 spots remain unused. Add 2 hours to your actual time spent in the Welland Canal on budget sheet.)

Loading and Unloading in Port:
When a player reaches a port he/she throws the die again for the number of hours it takes to load or unload the ship. Multiply the number of spots on die by 4 for total hours in port. Mark on budget sheet.

Arriving at Final Port Destination:
As soon as the first player arrives in the final port destination, all the remaining players must count how many spots on the die it takes them to arrive at port. Each spot counts as one hour lost in the final tally.

All ships arriving in the last port must unload and add the unloading hours to their shipping budget.

Projected Shipping Budget:
Before you begin the game read carefully through the Shipping Orders for this round of the game. Add up the total mileage for entire trip and fill in the space marked "travel time" in "*projected*" side of budget sheet. (Projected means estimated or guessed.)

Fill in average or normal loading and unloading times for each stop in shipping orders.

Notice which locks you must travel through to follow these shipping orders. Standard lock times are indicated by the number following the name on the budget sheet.

Add up the loading and unloading time as well as the canal and lock times to arrive at your total projected budget time in hours. Fill in the blank at bottom of projected budget column. Multiply hours times $750 for total cost projected for trip. Fill in appropriate blank at bottom of sheet.

Actual Shipping Budget:
Keep a budget of actual time gained or lost through situation cards, port times and lock and canal times.
When all players have reached final destination, each player should add up total cost in hours and dollars and find the difference between actual and projected budget figures in hours and dollars.

(1 Copy Each Player)

1. Shipping Orders - Stewart J. Cort: Self-Unloader

You are the 1000 foot long (305 meters) land-locked super- laker *Stewart J. Cort*, too large to go through the Welland Canal and St. Lawrence Seaway. You are owned and operated by the Great Lakes Steamship Division of Bethlehem Steel Corporation. You are very efficient and were the first self-unloading super carrier built on the Great Lakes. Your assignment for this trip is:

•Start from Taconite Harbor, Minnesota, fully loaded with iron ore pellets, 58,000 tons (52,727 metric tons).

•Travel eastward through Lake Superior to the Soo Locks (334 mi or 539 km) and wait 1 hour to lock through. Go through St. Mary's River to the De Tour Passage. From the north tip of Lake Huron pass through the Straits of Mackinac (90 mi or 145 km).

•Travel downbound, through Lake Michigan to Burns Harbor, Indiana (336 mi or 542 km).

•Unload at Burns Harbor. You can unload at a rate of 20,000 tons (18,181 metric tons) per hour (3 hours).

•Reverse your course, traveling upbound through Lake Michigan and Lake Superior to Tacomite Harbor. You are traveling empty (760 mi or 1,226 Km).

(1 copy each player.)

2. Shipping Orders - Amoco Indiana: Tanker

You are the 465 foot (142 meter) tanker *Amoco Indiana*. You are owned and operated by the Amoco Oil Company. You can carry 66,685 barrels (2,800,770 gal or 10,602,068 L) of petroleum products (fuel oil, gasoline, kerosene, etc.) Your assignment for this trip is:

•Start from Detroit, Michigan. You are fully loaded with fuel oil.

•Travel upbound through Detroit River, Lake St. Clair, St. Clair River, and Lake Huron to Sault Ste. Marie, Michigan (331 mi or 534 km).

•Unload at Sault Ste. Marie (8 hours). Travel empty downbound in Lake Michigan to Indiana Harbor, Indiana (424 mi or 684 km).

•Load gasoline at Indiana Harbor (8 hours). Travel upbound to Green Bay, Wisconsin (268 mi or 432 km).

•Unload at Green Bay (8 hours). Travel empty to Detroit, Michigan (557 mi or 898 km).

(1 Copy Each Player)

3. Shipping Orders - Golden Hind: Bulker (Or Laker)

You are the 620 foot (189 meter) bulk carrier *Golden Hind*. You are owned by Trico Enterprises and operated by the Quebec and Ontario Transporatation Company Ltd. You were built in 1954. Because you are a bulk carrier without the ability to unload yourself, you most commonly operate over long hauls (from Western Lake Superior through the Welland Canal and St. Lawrence Seaway to Montreal). You can carry 16,700 tons (15,182 metric tons) of grain or ore. Your assignment for this trip is:

*Start from Thunder Bay, Ontario, fully loaded with grain transported by rail from the Canadian wheat-growing province of Saskatchewan.

*Travel eastward through Lake Superior, through the Soo Locks (1 hour to get through), downbound through Lake Huron, downbound through St. Claire River, Lake St. Clair, Detroit River; eastbound of Lake Erie to Port in Colborne (south end of Welland Canal); through the Welland Canal (4 hours), eastbound through Lake Ontario to Kingston, Ontario, then eastbound through the St. Lawrence Seaway to Montreal (2 hours to go through the locks 1222 mi or 1971 km).

*Unload at Montreal to a grain elevator. Your cargo will later be loaded on an ocean-going bulk carrier which will ship your wheat directly to Liverpool, England. You can be unloaded at a speed of 1080 tons/hour (982 metric tons/hr). It takes 16 hours to unload.

*Travel empty eastward to Contrecoeur, Quebec (25 mi or 40 km). Load iron ore pellets for a "backhaul." At 2000 tons (1818 metric tons) per hour, it takes 8-1/2 hours to load.

*Travel back through St. Lawrence Seaway, westbound through Lake Ontario, south through the Welland Canal, and westbound through Lake Erie to Conneaut, Ohio (510 mi or 823 km).

(1 Copy Each Player)

4. Shipping Orders - Canada Century: Self-Unloader

You are the 723 foot (221 meter) self-unloading bulk cargo carrier, *Canada Century*. You operate mainly in the coal- carrying trade. You are owned and operated by the Canadian company, Upper Lakes Shipping, Ltd. Because you have self-unloading capacity you operate in the short hauls west of the St. Lawrence Seaway. In short hauls the capacity to unload quickly is very valuable as it shortens your time in port significantly. For example, you can unload at 8000 tons (7273 metric tons) per hour, but the fastest port unloading facility at Conneaut, Ohio, is only 3500 tons (3850 metric tons) per hour. You are more than twice as fast. Your assignment for this trip is:

*Start from Thunder Bay, Ontario, loaded with 26,700 tons (29,370 metric tons) of coal from the Western Canada coal fields.

*Travel east through Lake Superior, through the Soo Locks (1 hour to get through), downbound through Lake Huron, through the St. Clair River, Lake St. Clair, Detroit River, eastbound through Lake Erie, to Nanticoke where you will unload your coal for use in the electric power generating plant there (805 mi or 1298 Km). Unloading takes 4 hours.

*Travel empty west from Nanticoke through Lake Erie to Toledo, Ohio, where you will load up with coal (147 mi or 237 km). Loading takes 4 hours.

*Return eastward through Lake Erie to Port Colborne, through the Welland Canal (4 hours) to Hamilton, Ontario (294 mi or 474 km).

*Unload at Hamilton where your coal will be used in steel-making. Unloading takes 4 hours. Travel empty to Erie, Pennsylvania (122 mi or 197 km), through Welland canal (4 hours). Load with coal (4 hours) and travel to Courtright, Ontario, on St. Clair River, where your coal will be used at power plants (244 mi or 394 km).

(1 Copy Each Player)

Shipping Budget

Projected:

Travel time:

____miles (km) - 10 mph (16 km) = ____hours
(mark this number in travel time space at bottom of "Actual" column)

Average Loading and Unloading T imes:

1st stop: ______________________________hr
2nd stop: ______________________________hr
3rd stop: ______________________________hr
4th stop: ______________________________hr
5th stop: ______________________________hr
6th stop: ______________________________hr

total: ______________________________hr

Canal and lock times in hours:

Soo Lock (1) ____
Welland Canal (4) ____
St. Lawrence Seaway (4) ____

Total projected
travel time:

____hours

Cost for trip:

____hours × $650/hour

Actual:

Hours gained:

*Hours lost:
Net change: ____lost/____ gained
*From situation cards and final port penalties

Actual Loading and Unloading Times:

1st stop: ______________________________hr
2nd stop: ______________________________hr
3rd stop: ______________________________hr
4th stop: ______________________________hr
5th stop: ______________________________hr
6th stop: ______________________________hr

total: ______________________________hr

Canal and lock times in hours:

Soo Lock (1) ____
Welland Canal (4) ____
St. Lawrence Seaway (4) ____
If you arrive at locks while another player is in them, you must wait your turn. For each number on die you could not use, add 1 hour to lock time.

travel time ____
hours gained + ____
hours lost − ____

total load/unload time + ____
total lock and canal time + ____
Grand total ________hrs.
Cost for trip:
____hours × $750/hour = ____

actual hours ____
projected hours ____
difference ____
actual cost ____
projected cost ____
amount over or under budget ____

(1 Copy Each Player for Each Shipping Order)

Situation Cards

Teacher: Cut out the following and paste to 3 × 5 cards, one per card.

Tailwind and following waves boost your speed.
GAIN 2 HOURS
(You may not use this card westbound in Lakes Ontario and Erie because wings are rarely from the east.)

Recent refitting has improved your engine speed and efficiency.
GAIN 3 HOURS

Tailwind and following waves boost our speed.
GAIN 3 HOURS
(Do not use this card if you are westbound in Lakes Ontario and Erie because winds are rarely from the east.)

You've promised your crew extra shore leave if they unload the ship quickly.
They do.
GAIN 3 HOURS
(Save this card till you reach port where you unload)

Secret orders from the ship's owners give you permission to test speed of newly installed engine. For this turn only you travel at 15 mph (24 kmph). Mark gains in hours on actual travel time budget.

New system at your port cuts loading and unloading time in half. Divide time by 2 and mark on your actual budget.

Weather fair. Winds mild. Waves 5′ (1.5 m). No gain or loss.

FIRE! Stop all engines while your crew fights the blaze!
Lose 6 hours.

Fog sets in. Proceed at
1/2 speed relying on radar. Blow foghorn every 3 minutes for 5-10 seconds (according to Coast Guard regulations).
Lose 4 hours. (If in St. Mary's River lose 1 turn.)

Sudden gale force winds (35-65 mph or 56-105 kmph). If you are in a river, anchor till winds subside. If in open lake beware of being blown off course into shoals.
Lose 3 hours. (If you are Golden Hind or Tanker go to nearest sheltered cove and lose 1 turn.)

Snow limits visibility. Rely on radar. Reduce speed by 1/2. Lose 3 hours.

Port director has given your ship top priority. Save 2 hours in port. (Save this card till you reach port)

Port has recently installed additional equipment. Double loading or unloading speed. (Divide time by 2. Save this card till you reach a port).

Weather partly cloudy, barometer steady, winds light and variable. Waves calm. No gain or loss.

Weather fair. Winds 12-18 mph (19-29kmph) out of N. waves 6′ (2m). No gain or loss.

Weather cloudy. Winds 15-24 mph (24-39 kmph) out of S.W. Waves 6′-10′ (2-3m). No gain or loss.

Weather partly cloudly. Winds mild. Waves 1′-3′ (.3-1m) No gain or loss.

Weather cold and overcast. Winds 35-45 mph (56-73 kmph) from N.W. Waves 10′-12′ (3-4 m). Lose 2 hours.

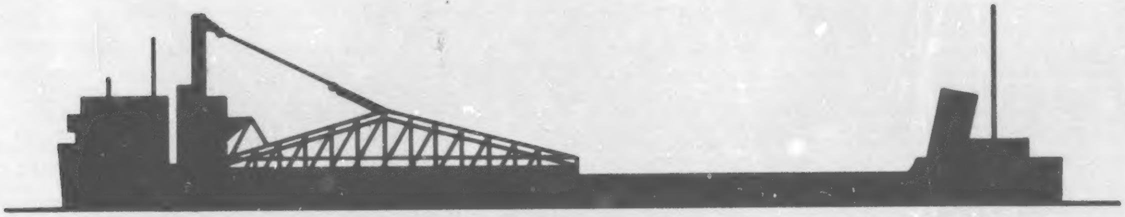
Your steering mechanism fails. Severe storm with 25′ (8 m) waves and gale force winds from the N.W. blows your ship 35 miles (56 km) off course to the south (1 whole square). Your ship will run aground if there is any land in the next square south. If so, you lose the game while rescue and salvage ships try to free you. If not lose 4 hours while ship technicians repair steering.

Weather cloudy. Barometer dropping. Winds rising to 30 mph (48 kmph) from N.W. Waves 10 ′ (3m). Lose 1 hour.

Your hull is filling with water. Your pumps can barely keep up. Travel to nearest port and lose 12 hours for emergency repairs.

(1 copy each Player).

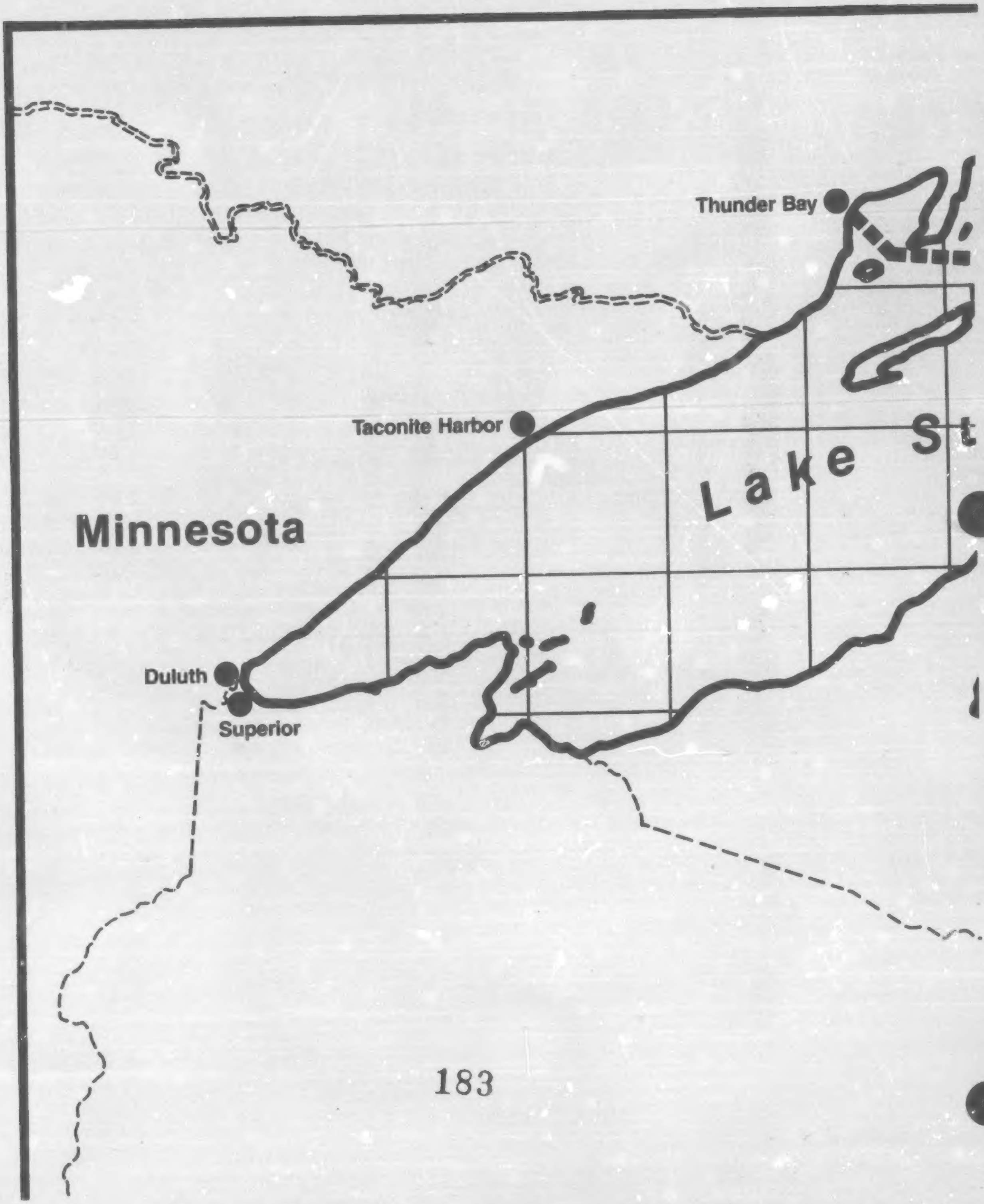
Self-Unloading Super Laker



Self-Unloading Laker

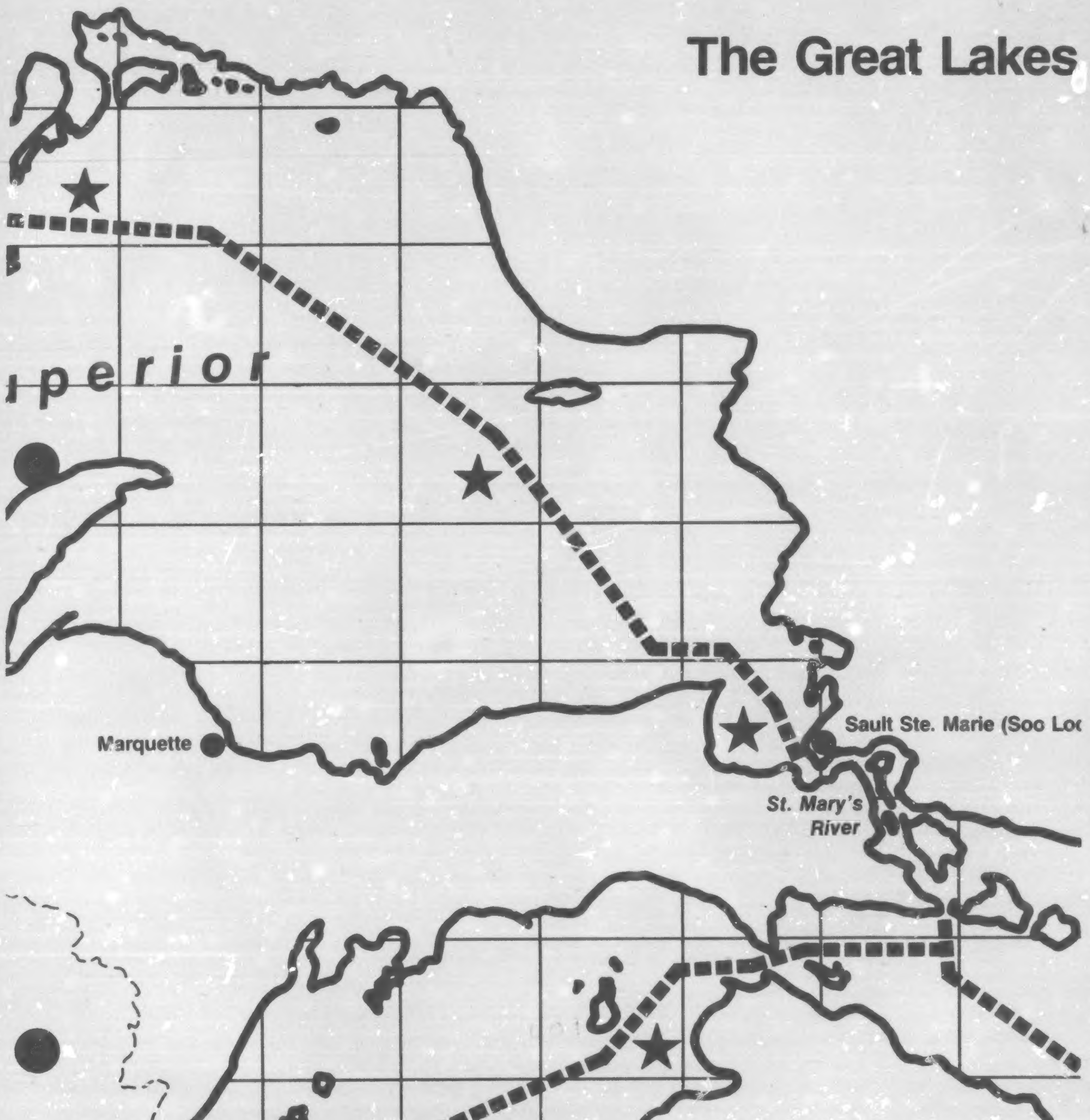
Tanker

1



Thunder Bay
Taconite Harbor
Minnesota
Lake St
Duluth
Superior

The Great Lakes

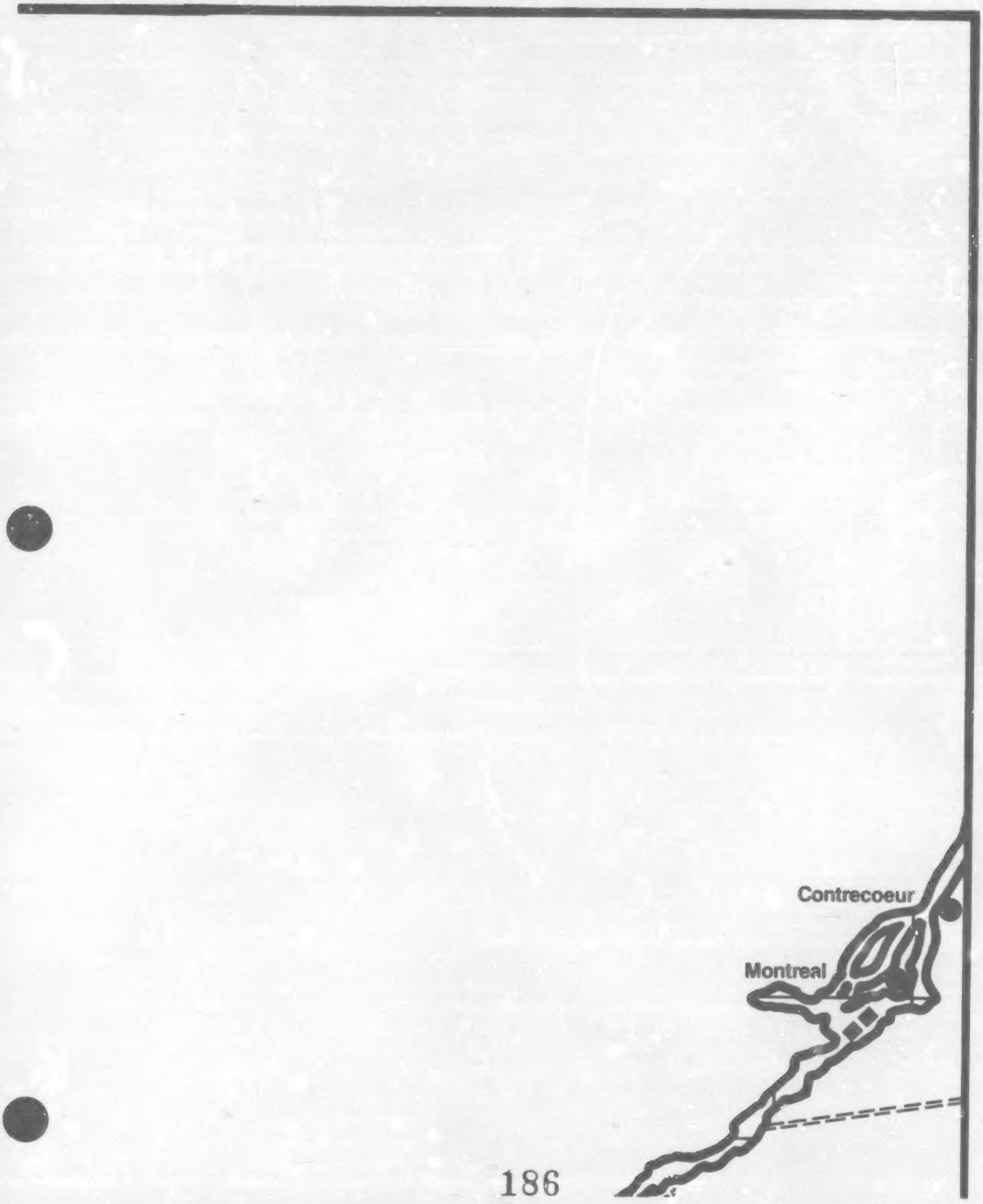

perior
Marquette
Sault Ste. Marie (Soo Lo
St. Mary's River

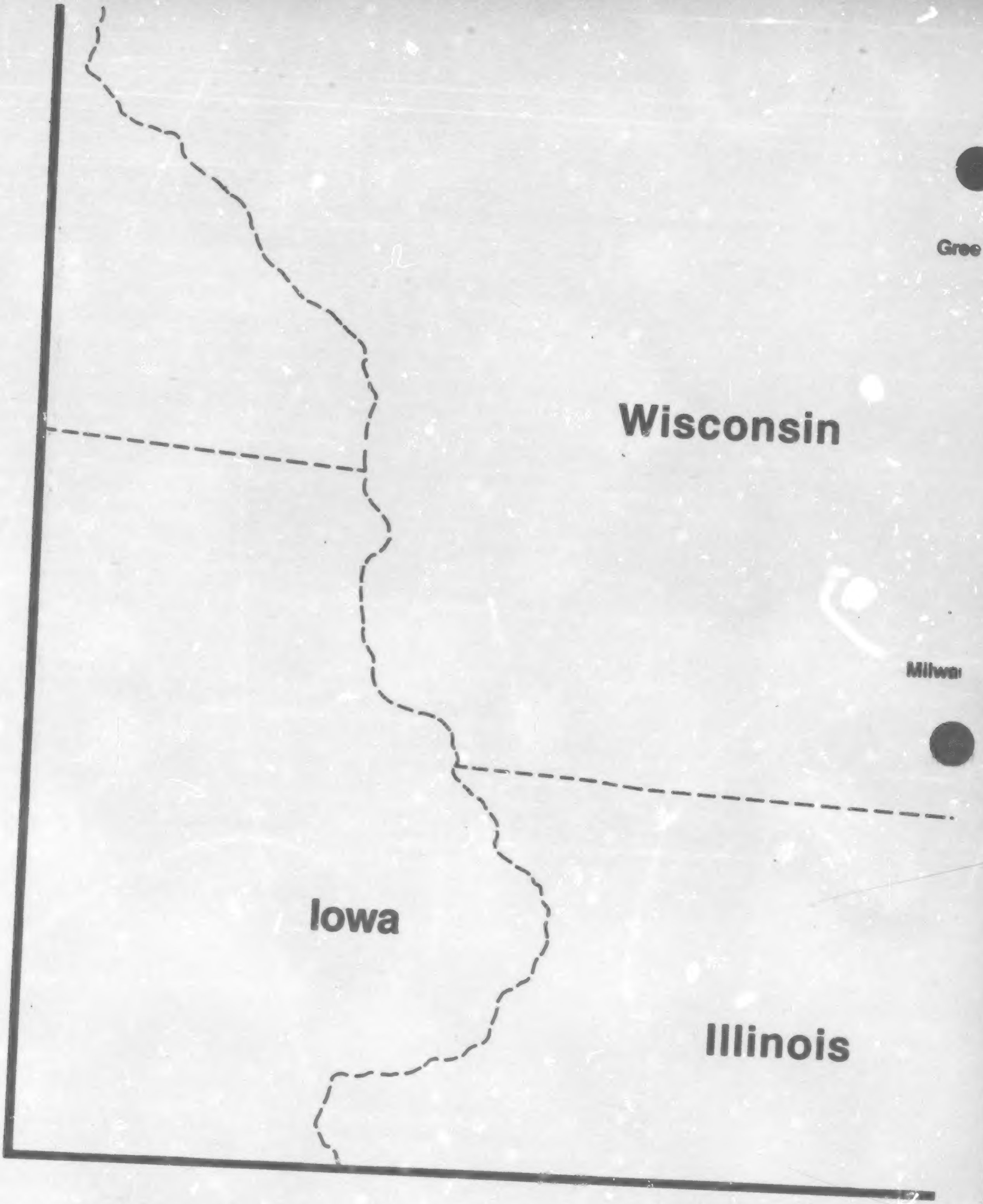
3

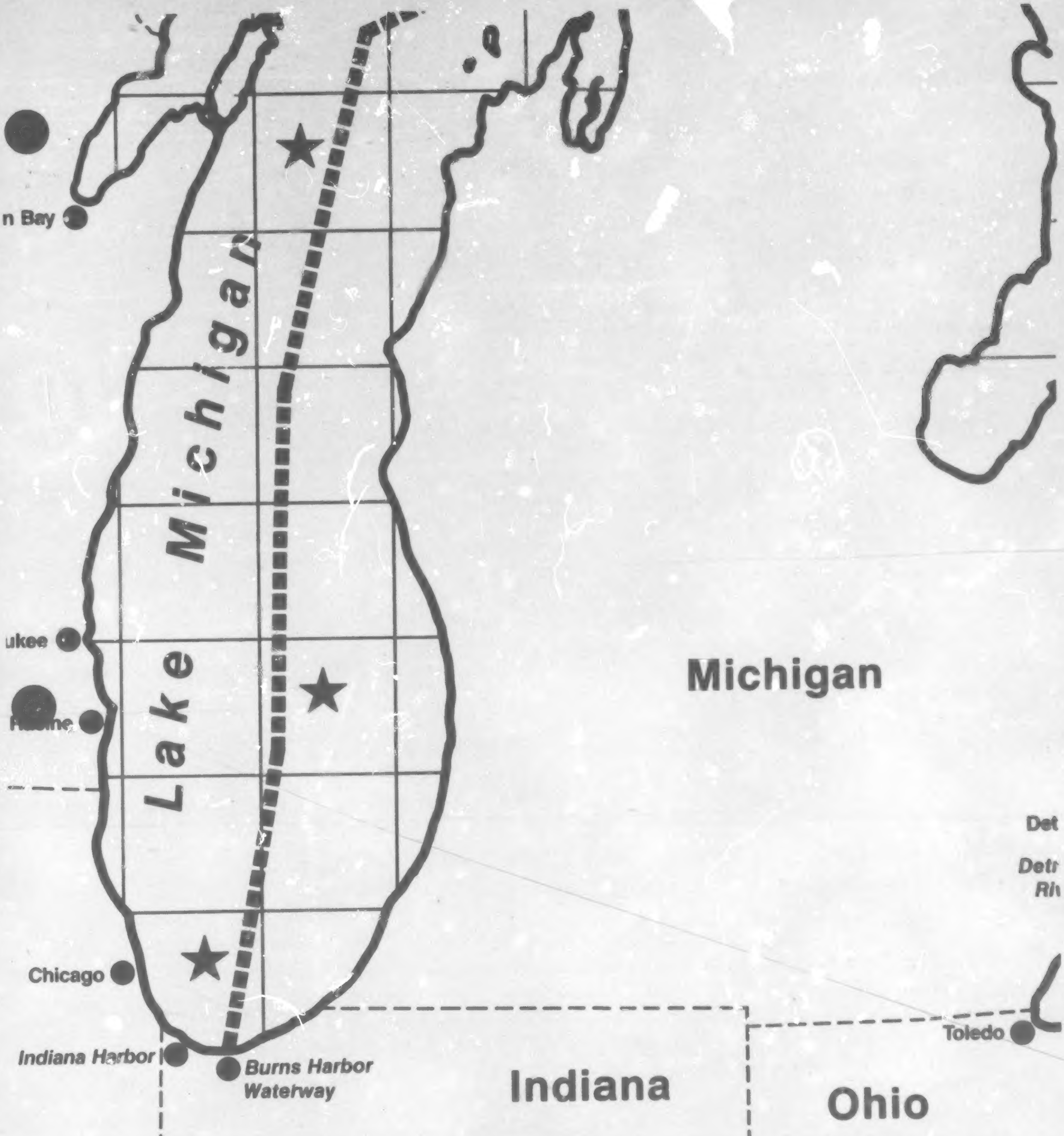
Shipping Game

:ks)

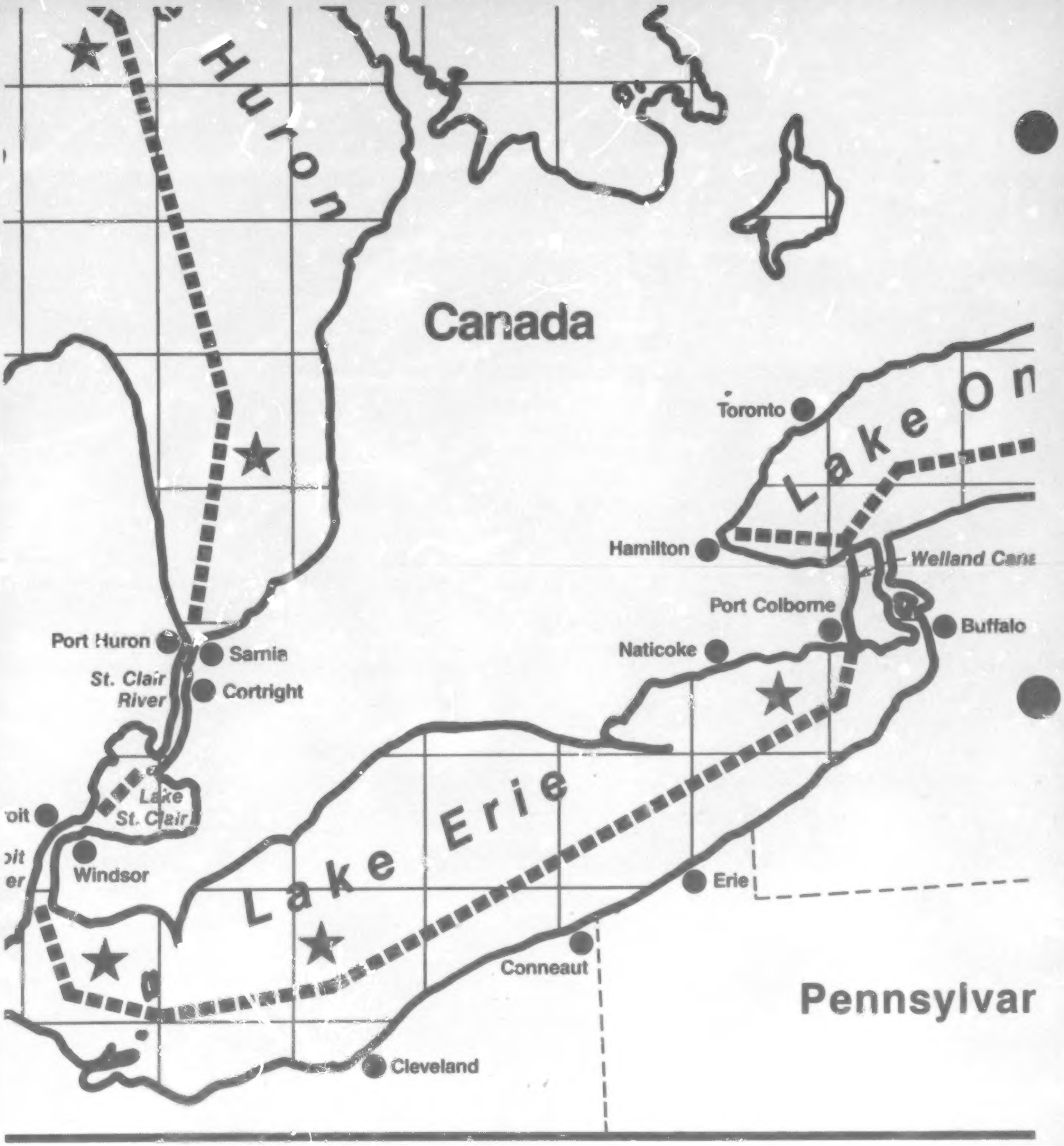
4


Contrecoeur
Montreal

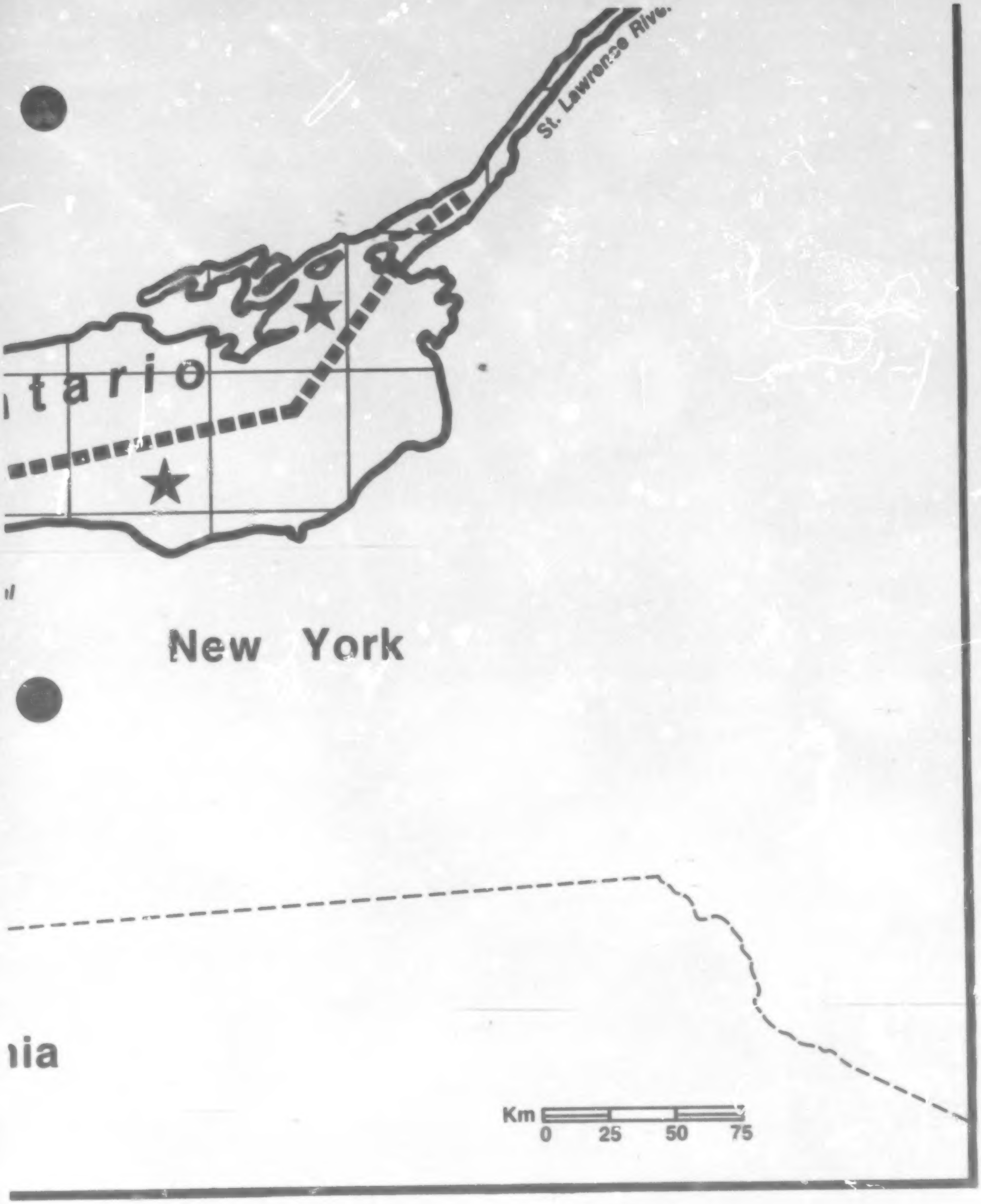

Gree
Wisconsin
Milwa
Iowa
Illinois


n Bay
Lake Michigan
ukee
Racine
Chicago
Indiana Harbor
Burns Harbor Waterway
Michigan
Indiana
Ohio
Det
Detr
Ri
Toledo

6


Huron
Canada
Toronto
Lake On
Hamilton
Welland Cana
Port Colborne
Buffalo
Naticoke
Port Huron
Sarnia
St. Clair River
Cortright
Lake St. Clair
oit
oit
er
Windsor
Lake Erie
Erie
Conneaut
Pennsylvar
Cleveland

7


St. Lawrence Rive.
tario
New York
nia
Km
0
25
50
75

Activity 23: The Gull Game

Through playing an exciting board game students learn about the life cycle of a Great Lakes herring gull and the effects humans have on it.

Grades: 4-8
Subject Area: Science

One of the most common and visible symbols of the Great Lakes is a white and grey gull flying overhead or perched on pier walls or following commercial fishing boats. Children who have never seen a Great Lakes fish will probably recognize and easily identify a gull. Gulls are important to the Great Lakes ecosystem as indicator species. If toxic chemicals are entering the lake they may show up in gull eggs causing thin shells and subsequent egg breakage and loss. Human disturbance of nest sites is another problem that may lower nesting success.

The most commonly seen gulls in all the Great Lakes are herring gulls and ring-billed gulls. Ring bills are about 4-6 inches smaller than herring gulls and have a black ring around the pointed end of the bill. Herring gull legs are flesh colored, where ring bills have yellowish or pale greenish legs.

The life cycle processes and the hazards faced by gulls in this board game accurately portray real life for gulls. Research has shown that 20%-40% of all eggs laid do not hatch and that 50% of the young which hatch do not survive to the end of their first year.* One object of this game is to give students a personal sense of this natural process. This activity has been reviewed for accuracy by the Great Lakes gull researcher with the Wisconsin Department of Natural Resources.

---

*James T. Harris and Sumner W. Matteson, "A Report to the University of Wisconsin Sea Grant College Program: 'Gulls and Terns as Indicators of Man's Impact Upon Lake Superior,' " Madison, WI, February, 1975.

Procedure

1. Introduce students to herring gulls with the information on the attached sheets. (Optional: show film "Signals for Survival" cited in Resources at end of activity.

2. Photocopy game parts and set up games. Discuss the rules of the game and play it with the students.

3. After everybody has played the game talk about "life as a gull." You may want to stimulate discussion with some or all of the following questions:

   A. From playing the game, what have you learned about:
   - what gulls eat;
   - what eats gull eggs;
   - how humans cause problems for or help gulls;
   - how many eggs a gull normally lays;
   - how many birds will survive to return as year-old birds if 100 eggs are laid at a nesting site;
   - the problems caused for gulls by living in large colonies when they nest; and
   - the advantage of living or migrating in large groups?

   B. How accurate are the facts in the game? How could we find out?

   C. What important ideas does the game involve?

   D. Is anything missing from the game that might have made it more like real life?

   E. Can you win the game by chance? Does this reflect life?

   F. What purpose can this game serve?

   G. How would you like to change the game?

   H. How would you like to be a herring gull?

Taking It Further

1. To emphasize the impact of humans, have students play the game again disregarding all game instructions which relate to humans. Count how many gulls survive when the game is played without human interference. Discuss the results with your students.

2. Read all or part of ***Jonathan Livingston Seagull***, Richard Bach, Avon Books, New York, N.Y. 1970. In a discussion:

   A. Compare Jonathan's life to the life in the Gull Game.

   B. Ask if gulls really talk, have dreams, etc.

   C. Ask about the difference between *OBSERVATION* and *INFERENCE*
   (observation = what? inference = why?)

   D. What happens when people confuse observation and inference?

   E. Introduce the concept of anthropomorphism (ascribing human feelings to something not human) and talk about the consequences of anthropomorphism. (An extreme example of anthropomorphism is people dressing pets in clothes and treating them like children.)

Resources:

Books

Bach, Richard, *Jonathan Livingston Seagull*, Avon Books,New York, 1970.

Eimerl, Sarel, *Gulls*, Simon and Schuster, New York,1969. This book for upper elementary readers describes various gulls and their habits. Can be used to teach about Great Lakes gulls.

Tinbergen, Niko and Hugh Falkus, *Signals for Survival*, Clarendon Press, Oxford University Press, England, 1970. Profusely illustrated with photographs and drawings. Text is easy to read, detailed about communication patterns, courtship, nest-building, mating, etc.

Wright, Dare, *Look at a Gull*, Random House, New York, 1967. To be read to primary age children, this book contains a photographic essay of the life of a gull, as told by the gull. Facts about gulls are presented in a simple style.

Films

"Signals for Survival, Part I & Part II," 50 min., Color,McGraw-Hill, 1970. Illustrates the communication behavior of a species of sea gulls along and off the England coast. Using the gull as a case study, the film defines some of the features of animal communication study. Based on the work of Niko Tinbergen of Oxford, the film covers the territory, courtship and copulation and chick-raising behaviors of these sea gulls. (Suitable for high school aged students and above. Review before showing to younger children.)

"Birds of Shore and Marsh," 14 min., Color, Coronet, 1971. Visits the seashore, beach areas, salt marshes and mud flats to study some of the marine ecosystem. Views sandpipers, plovers, herons, gulls, terns and other forms of life as food web, habitats and life styles are discussed. Comments on pollution and shoreline environmental damage endangering any ecosystem. (Suitable for intermediate elementary, junior high and high school aged students.)

"Sea Gull," 10 min., Color, AIMS, 1973. Observes sea gulls through the eyes of a young boy. Shows close-up sequences of gulls taking off, in flight and landing; preening their feathers; caring for young. Views their eating habits and discusses gull varieties. Emphasizes the importance of observations. (Primary and intermediate)

"Sea Gull," 14 min., Color, Coronet, 1968. Shows characteristics of the large flocks inhabiting certain Pacific Islands. Describes the selection of the nesting site, courtship display, nest building and incubation. Demonstrates how the gull readily incubates substitute eggs and defends nesting territories and fledglings. (Primary, intermediate, junior high and high school.)

Introduction To The Gull

by Charles Vaucher*

At any season of the year inland visitors arriving at the Great Lakes coast are welcomed by the wild cries of the gulls and realize that they have indeed reached the lake. Gulls are found everywhere, in towns and in remote areas. They are symbols of the coast.

During the summer you will find them sitting like sentinels on buildings, piers, boat masts and large rocks. They are always on watch for returning boats. Gathering where fish and garbage are plentiful, they are bold and opportunistic. They snatch anything that looks like food. Gulls often follow fishing boats for miles waiting for scraps and fish parts to be thrown overboard.

The gulls fly effortlessly on powerful wings. They are at home on both water and land. This adaptability keeps them safe from the many hazards of their life.

They range up and down beaches capturing fish, crayfish, small snails and other crustaceans and molluscs. Dead animals, fish washed ashore by the lakes and garbage add to their dinners. They may raid other sea bird colonies for eggs and nestlings when nesting together on the same island. They may even plunder the nests of neighboring gulls.

Though they sometimes may appear indolent, the gulls are always on the alert, ready to cry out at danger or feast.

HERRING GULL:

Description: In summer its back and wings are pale greyish blue, the rest of the body and tail is white. The ends of the primaries (longest wing feathers) are black tipped with white. Secondaries are tipped with a broad white band. Its bill is yellow, legs and feet flesh-pink, and iris of the eye is pale yellow. Length 58-65 cm., wing-span 130-150 cm.

Breeding: The gulls nest in colonies on grassy islets, cobble beaches, tops of cliff ledges, dunes and meadows. Colonies range from a few pairs to hundreds. Generally each female gull lays 3 eggs (73 x 48 mm.) from March to June according to latitude. Incubation: about 25 days by both sexes. Fledging: about 35-49 days old.

Range: These gulls are found throughout the Great Lakes region. During winter a bird's first migration to the Gulf coast may occur. In later years birds migrate only a few hundred miles south to open water and ready food sources.

Source:

*Charles Vaucher, *Sea Birds*, Oliver and Boyd, Edinburgh, Scotland, 1960 (translated by James Hogarth, *Oiseaux de Mer*, Delachaux & Niestle, SA, Neuchatel, Switzerland), pp. 113-114, 226-227. (Adapted and quoted by permission.)

To Set Up The Gull Game

So that all students can play simultaneously, you may want to make enough copies of the game to have one for every 3-6 students in your class. These instructions are for one game set (3-6 players).

1. Photocopy the six sheets of the game board. Assemble them on a sheet of poster board at least 17" x 22" (43 x 56 cm). If the game is to be used very much, you may want to cover the board surface with clear plastic or laminate it. Board sheets are numbered 1-6. They should be placed in the following order:
   1 2 3
   4 5 6

2. Photocopy the rules of the game, "fates," "events" and "bonus" card sheets. Cut events and bonuses apart and glue to different colored standard 3x5 cards or mark backs of cards with "E" and "B". Fates sheets might stand up to play better if glued to lightweight board and covered with clear plastic (or place them in plastic slip-on covers).

3. Provide one die and three tokens for each player (up to 18 tokens). Tokens can be coins, buttons, wrapped candies, etc. Students might enjoy making small tokens (in the shapes of gulls) out of flour clay. They can be dried and painted or numbered to distinguish them.

Rules For The Gull Game

3-6 players. You will need 3 tokens for each player and 1 die.

Object Of The Game: The object of the game is to go from newly laid egg to year-old gull joining a flock in the general area of the nest grounds (END). Yearling gulls are not old enough to lay eggs themselves.

Winner: The first player to reach the END with one gull token is the winner. However, if a roll of the die gives a player *more* moves than needed to reach the END, the player must wait until his or her throw of the die gives the exact number (or the exact number if the player can add a bonus card). In other words, if a player needs 2 moves to win but rolls a 3, that player must wait another turn and try again.

Start: Each player has three tokens or markers. (Gulls commonly lay 3 eggs in a nest.) Each marker represents one herring gull. For markers you can use buttons, coins, small stones or other small objects. Make sure you will be able to tell your three markers apart from the other players'. Three to six players can play. Roll die for start. Player with highest number goes first. Play moves to the left. (If two players have the same number they roll again until one has highest score.)

Play:
1. Move one space for each spot on the die.
2. Only one token may be on a space at a time. You may skip over another gull (count the space). If your number or an event card makes you land on a space where another gull is already sitting, move back to the closest space behind it.
3. On some parts of the board there are two parallel paths. Once you start on a path you *may not* cross over to the path beside it.
4. Along the path are five life stage circles: "Hatching Day," "Learn to Fly," "Learn to Fish," "Migrate South," and "Migrate North." You must stop in each circle. You do not need the exact number on the die to enter. [For example: there are two spaces between you and the circle. You throw a 4. Count each space as 1 and the circle as 1 (total 3). You enter the circle and lose the remaining 1.]
5. Along the path are spaces marked with "E." If you land on one take an event card and follow its instructions immediately. Do not wait for your next turn.
6. Except when a gull token is in a life event circle, you may move any of your tokens on a turn. You may not divide a number from a single throw between two tokens.

"Hatching Day" And Other Life Event Circles:

1. You must stop in the circle.
2. On your next turn you *must* find out the fate of the gull in that circle even though you have other gulls on the board you want to move.
3. To find out your fate throw the die once. On the sheet for that circle read the fate with the number you have thrown. ([illegible] *Example*: You land in the "Learn to Fly" circle. Throw the die and get a 1. Under "Learn to Fly Fates" you find the number 1 and read: "Parent gulls accidentally push you off cliff. Miraculously everything works. You can fly! Fly on with 2 extra spaces.")
4. Immediately throw the die again (on the same turn). Move the number of squares indicated on the die. (If the fate says, for example, take 2 extra spaces, add them to the number on the die. If the fate says "Return to start" do not throw die but return directly to start.)
5. "Proceed normally" means throw the die to move. You have no penalties or bonuses in your fate.
6. If your fate is the death of your gull (and 20-40% of all eggs laid do not hatch and 50% of all hatched young do not survive to one year*), return your marker to start. You may move that marker into play again on your next turn if you wish.

*James T. Harris and Sumner Matteson

Bonus Cards:

1 .When you enter "HATCHING DAY," "LEARN TO FLY," AND "LEARN TO FISH," take a bonus card from the stack and keep it.
2. You may play a bonus card on any turn by adding it to the number you threw on the die.
3. You *may* use a bonus card to get the exact number to enter "CLAIM A TERRITORY" and win the game.
4. You *may not* use more than one bonus card on a turn.
5. You *may not* play a bonus card without a roll of the die.

Event Cards:

1. When you land on a space marked with an "E" take an event card and follow its instructions immediately. Place cards on discard pile. Shuffle and reuse when original pile is empty.

Fate Cards

For each major stage in your development as a gull you stop in a circle on the game board. You learn your fate in that life stage by throwing a die. Read the fate which follows the number on your die. They are listed below. Follow instructions given with fate. "Proceed normally" means roll the die again and move that many spaces.

A. Hatching Day Fates

1. Storm causes high waves. Your nest is washed away. Return to start.
2. Parent gulls have large nest territory separate from main colony. There are no boundary fights with other gulls to keep them off nest. You stay warm and comfy and hatch on time. Take 2 extra spaces.
3. Visitor to colony scares your parents off nest. Incubation is interrupted and hatching is delayed. Put bonus card back and subtract 1 from # on die. If you throw a 1 stay where you are.
4. You hatch first. Because you are bigger and stronger than your fellow nestlings you get extra food. Take 2 extra spaces.
5. Skunk invades colony. You are eaten. Return to start.
6. You barely escape being eaten by a crow, but manage to hatch safely. Proceed normally.

B. Learn To Fly Fates

1. Parent gulls accidentally push you off a cliff. Miraculously everything works. You can fly! Fly on with 2 extra spaces.
2. You can't quite get the knack of flying. Red fox catches you for lunch. Go back to start.
3. Plenty of food and fine weather. You're a flying ace. Go directly to "Learn to Fish".
4. Human boaters land on your nesting island before you learn to fly. You run away from nest and other adult birds defend their territory by pecking at you. You never make it home. Go back to start.
5. Crash on take-off. Your bruises slow you down. Put bonus card back and subtract 1 from # on die. If you throw a 1, stay where you are.
6. Anybody can fly. See! Just flap your feathers. Proceed normally.

C. Learn To Fish Fates

1. You learn to fish in a year when alewives are plentiful. The fishing is easy and you get quite good. Add 3 to # on die.
2. Parent gulls bring no food today so you will try fishing on your own. You try hard but there are no minnows where you are looking. Put bonus card back. Proceed normally.
3. Fishing is fine. Proceed normally.
4. Storms and winds for 3 days keep you from fishing enough. You're weak and hungry. Subtract 2 from # on die. If you throw a 1 stay where you are.
5. You learn to fish near a fishing pier. Food is plentiful in garbage cans. Add 1 to number on die.
6. Parent gulls no longer bring food. You can't fish well enough to feed yourself. You're too weak to fly to nearest source of garbage. You starve to death. Go back to beginning.

D. Migrate South Fates

1. Flying in unfamiliar territory, you are caught by a gust of wind and blown into electric wires. You are electrocuted and die. Go back to start.
2. Strong wind in your direction lets you ride to South easily. Add 2 to # on die.
3. You flock with several other gulls. There's safety in numbers. Advance number on die or 5 spaces which ever is more.
4. Storm delays migration. Subtract 2 from number on die. If you roll a 1 stay where you are.
5. Uneventful migration. Proceed normally.
6. The weather in the north is fine and fishing is easy. Loaf around and delay your start on migration till next turn. Roll die again next turn for new migration fate.

E. Migrate North Fates

1. You have no problems flying north and finding nesting sites near your home. Proceed normally.
2. Strong winds in your direction allow quick migration. You get to nesting site in especially good condition. Add 1 to # on die.
3. Humans have built a warehouse on the site where you were hatched and there are no gulls

living there now. Lose turn while you look for a flock.*
4. Bad weather and poor food supplies weaken you on migration. Subtract 1 from number on die.
5. "Home" is near garbage dump. Food is easy to get. Add 2 to # on die.
6. High water levels in the lake have washed out the low island where your former nest site was located. No other gulls around. Lose one turn while you search for new flock.*

*Lose one turn means you pass the die on the to next player, even though you may have other gulls to play on the board.

Events Cards

Teacher:

Cut out these events and paste on 3x5 cards. Your cards should be a different color than the bonus cards, or mark the reverse with an E.

New landfill site opens. There is lots of garbage to eat. Advance 2 spaces.

Picnickers leave garbage behind. The free food lets you snooze in the sun. Advance 1 space.

The weather stays sunny and mild for a whole week. Fishing is great! Advance 2 spaces.

Living in a colony is safer. Gulls on watch warn you of danger. You easily avoid being eaten by a raccoon. Advance 2 spaces.

Take a free ride on the wind. Roll die for free turn.

Fishing boat dumps dead bait, fish heads and other garbage over side. You eat all you want. Advance 3 spaces.

Charter boat leaves bait on dock. Eat it while they're having breakfast. Advance 1 space.

DDT in pesticides banned by law. Your body is relatively free of DDT contaminants. This card cancels other DDT cards. Take a free ride on the wind. Roll die for free turn.

Take a free ride on the wind. Roll die for free turn.

Storm keeps you from fishing for a day. Go back 1 space.

You haven't had enough to eat for a while. You're not good at fishing. Subtract 2 from next roll of die. Go backwards if it's a 1.

You stop to eat near fruit orchards. DDT in your food enters your body. Any eggs you lay in the future may break when you try to hatch them. Keep this card. (DDT is still heavily used in many countries outside the U.S.)

Your neck gets caught in plastic beer can 6-pack ring. You can't swallow food. You die. Go back to start.

Kid with new .22 rifle likes to practice target shooting on gulls. It's your bad luck to be the target. Go back to start.

Boaters ariving at colony site scare all birds away. You return before your neighboring birds. Have eggs for breakfast. Advance 2 spaces.

Garbage from landfill site contaminated with chemical PCB. You die of chemical poisoning. Go back to start.

Bonus Cards

Teacher:

Cut out these bonuses and paste them to 3x5 cards. You will need a different color of cards from events cards or mark the back of these cards with a "B".

Advance 1 space
Advance 1 space
Advance 3 spaces

Advance 1 space
Advance 1 space
Advance 3 spaces

Advance 1 space
Advance 1 space
Advance 3 spaces

Advance 1 space
Advance 2 spaces
Advance 4 spaces

Advance 1 space
Advance 2 spaces
Advance 4 spaces

Advance 1 space
Advance 2 spaces
Advance 5 spaces

Advance 1 space
Advance 2 spaces
Cancel Event Card

Advance 1 space
Advances 2 spaces
Cancel your Fate. Throw die again.

Advance 1 space
Advance 2 spaces
Cancel your Fate. Throw die again.

Advance 1 space
Advance 2 spaces
Cancel Event Card

Advance 1 space
Advance 2 spaces

The Gull Game

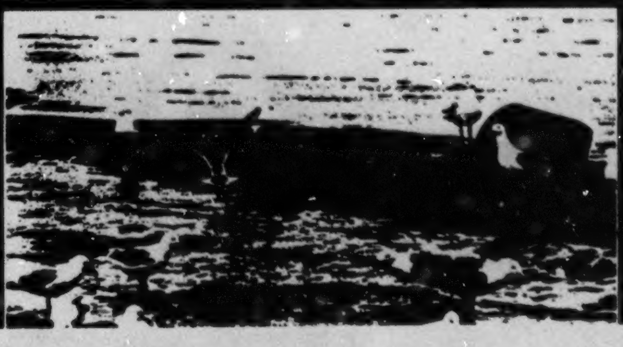
START

Nesting Site

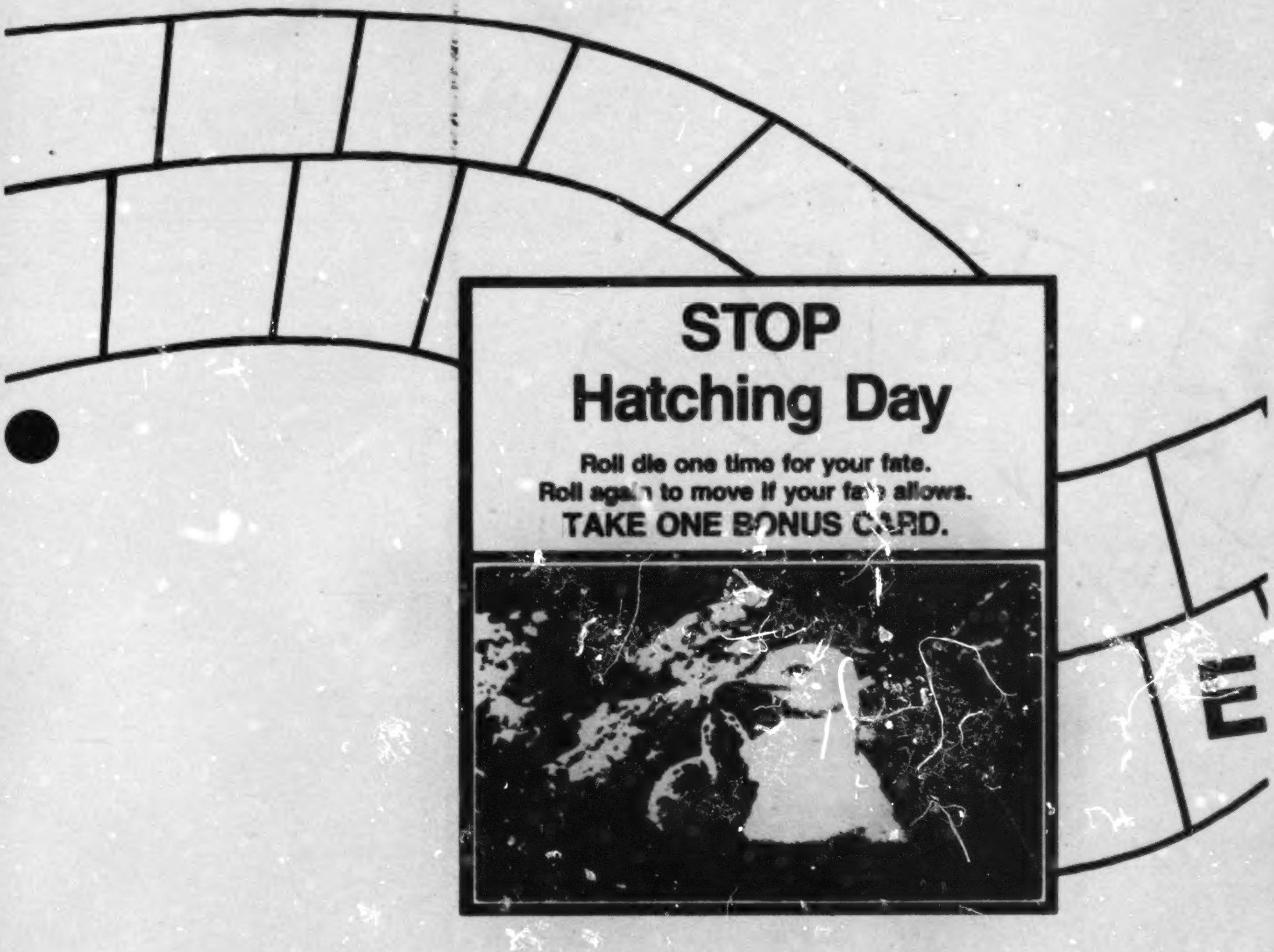
END

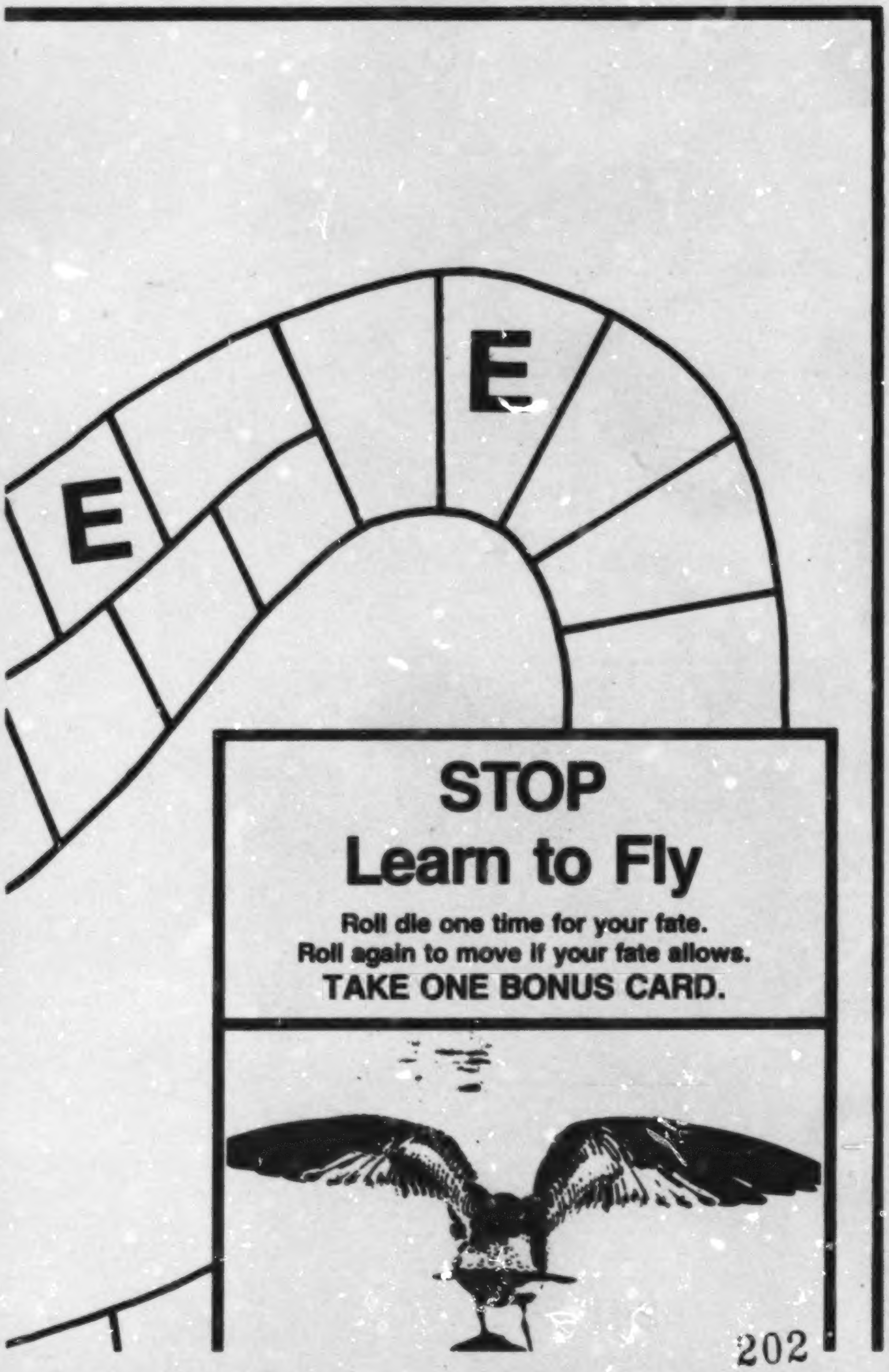
Join a Flock

You must have the exact number
to enter and may USE A BONUS CARD.



2

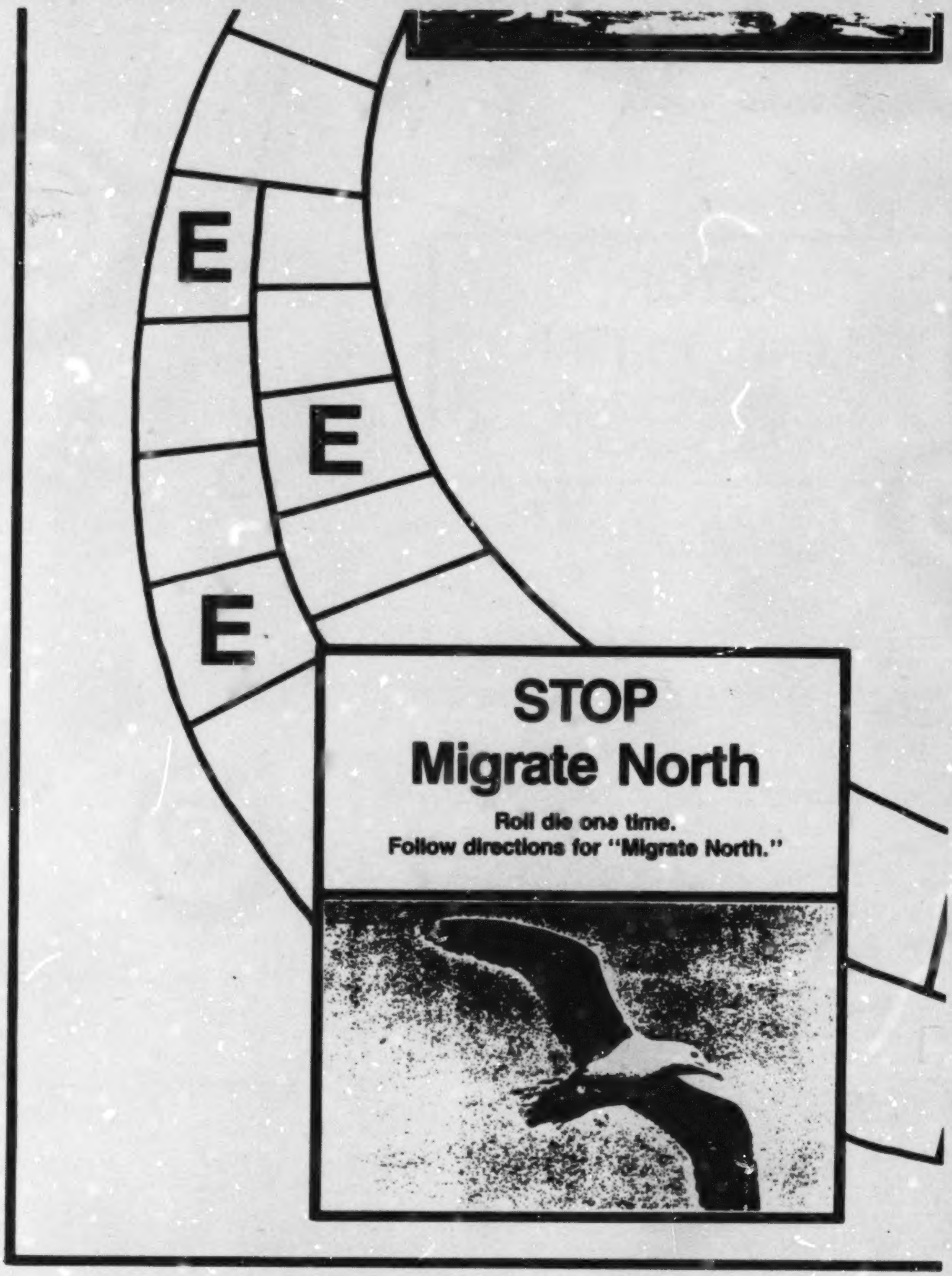

STOP
Hatching Day
Roll die one time for your fate.
Roll again to move if your fate allows.
TAKE ONE BONUS CARD.
E



STOP

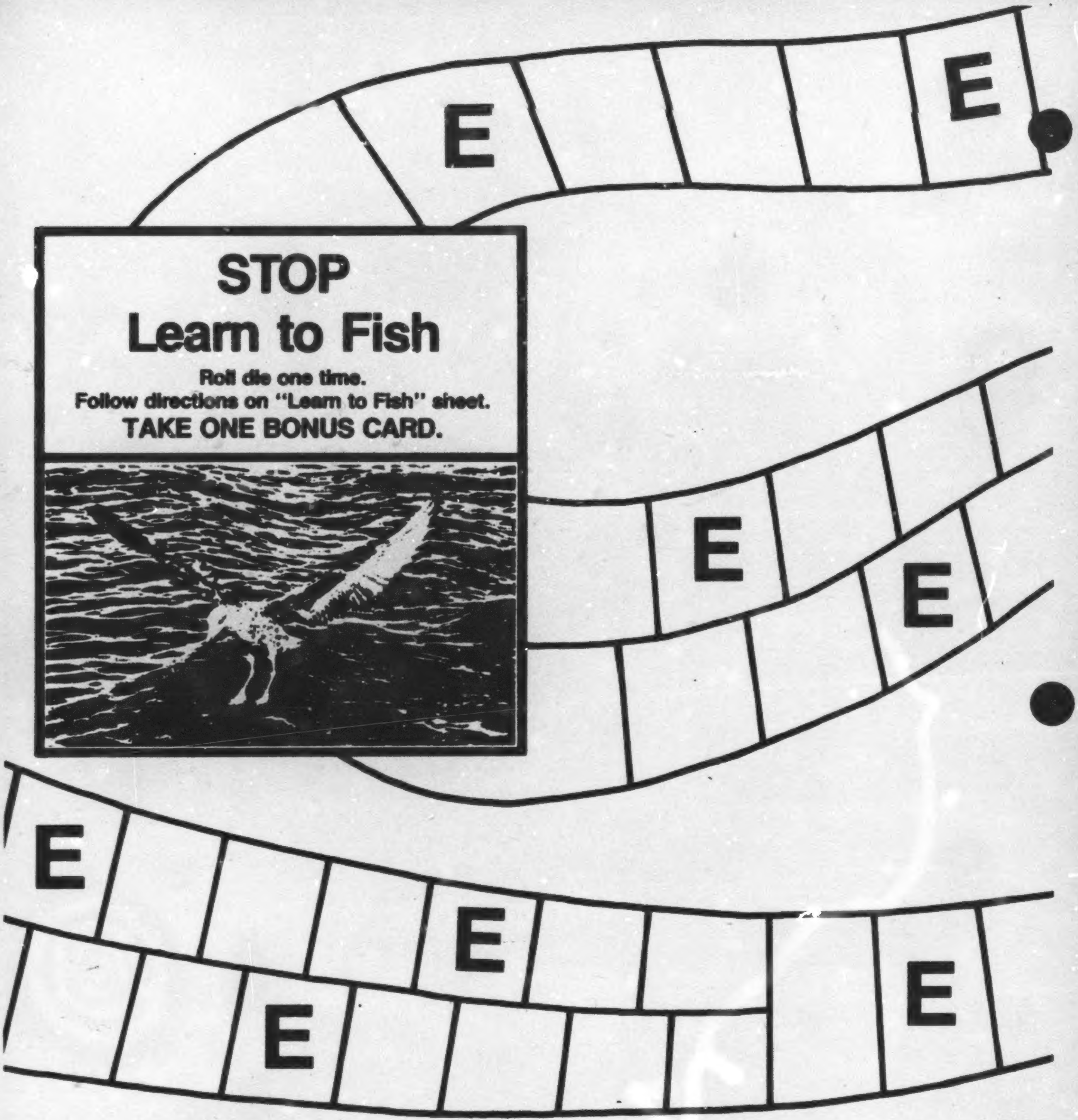
Learn to Fly

Roll die one time for your fate.
Roll again to move if your fate allows.
TAKE ONE BONUS CARD.



STOP
Migrate North

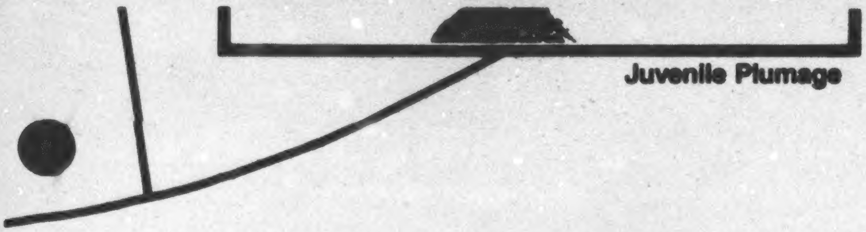
Roll die one time.
Follow directions for "Migrate North."

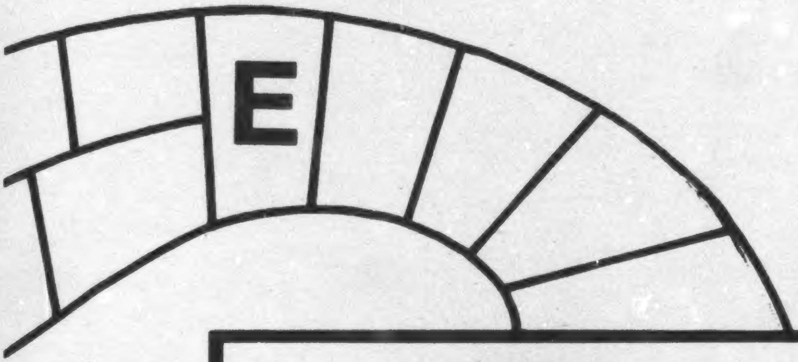


STOP

Learn to Fish

Roll die one time.
Follow directions on "Learn to Fish" sheet.
TAKE ONE BONUS CARD.


Juvenile Plumage



STOP
Migrate South

Roll die one time.
Follow directions for "Migrate South."

Adult Plumage

Activity 24: Solving The PCB Problem At Manitou Harbor

PCBs give students' problem-solving abilities a work-out in this re-creation of a pollution episode.

Grades:
7-8 Subject Areas: Social Studies, Science, Language Arts

The Great Lakes face many problems. The people who live on, use and manage the lakes have the most interest and responsibility for addressing the problems. But every hometown in every state has problems which could be solved creatively. In this activity students learn about a dilemma facing many Great Lakes ports. (The situation has been given a fictional name.) They also learn and exercise creative problem-solving techniques which can be applied to other problems.

Procedure

1. Copy and distribute the problem description and map at the end of this activity. At your discretion students can work in small groups or one large group. Brain-storming might work better in small groups while evaluating and summarizing are easier in large groups.

Read the problem with the students and follow the four steps listed below:

A. **Fact Finding.** A fact is a set of ideas that can be agreed upon, usually after common observation. For example, the problem statement in this activity begins with a fact - Manitou Harbor is becoming shallower. We need correct information on the situations, events and relationships. List facts related to the problem, both those in the description and those which come from the students' own knowledge. List everything you can think of. Then narrow the list to a few facts of particular usefulness.

B. **Problem Finding.** Review your facts and try to pinpoint the actual problem. Look at the problem in different ways. Reduce the list at the end to one or two problem statements. Restate your problem by beginning your sentence this way: "In what ways might . . . ?"

C. **Idea Finding.** Brainstorm to list as many ideas for solving the problem as possible. Wild, far-fetched ideas should be encouraged and accepted as these often lead to good solutions. *The basic rule is not to criticize or allow criticism.* Encourage "hitch-hiking" ideas. Students will spontaneously add to and improve each other's ideas. Appoint a volunteer idea recorder to keep track of all the suggestions.

D. **Solution Finding.** Time for judgment. Select several of your brainstorming ideas which offer the greatest potential. Write why each was selected. Was the idea practical, possible, cost effective? These will become the yardsticks for measuring your idea's worth. Discuss the advantages and disadvantages of each and select the most workable solutions.

2. Have students summarize their statement of the problem and the agreed upon solution(s). Ask them to list the elements that would make the solution work. For example: suppose one solution to the Manitou Harbor problem is to eliminate shipping and use the harbor only for recreational boats. Then the coal company must be persuaded and compensated for the disruption in its business. Alternate transportation routes for coal, oil and salt would also have to be found.

- In what ways are the solutions alike?
- In what ways are the solutions different?
- How do you account for these?
- As a result of our work, what can you conclude?

Taking It Further

1. Have students investigate what PCBs were used for. Some common uses include inks, paints, adhesives, and transformer coolants. What properties do PCBs have that make them useful in these products? How do these same properties affect the environment when PCBs have entered it?

2. Study a Great Lakes port or channel which actually is being dredged or is scheduled for dredging. This information can be found by contacting individual port directors. Find out what problems that dredging operation is facing. Students may wish to write to the decision-makers involved in the project offering their analysis and proposed solution.

3. Apply the creative thinking/problem solving process to a local school or community problem. Write up the proposed solution and present it to the appropriate decision-makers or develop a plan for implementing it. (For example: The problem is smoking in the school lavatories. If the solution involves convincing students to quit smoking, then your students need a plan to convince their fellow students.)

4. Try out "Cobbler's Cove," a simulation of coastal planning for students developed by the N.Y. State Sea Grant, 21 South Grove St., East Aurora, N.Y. 14052.

Sources:

Gary A. Davis, *Creativity Is Forever*, Baumgartner Publications, P.O. Box 176, Sun Prairie, WI 53590, 1981, pp. 43-44, 58-59. A 135-page paperback book which summarizes theories of creativity, describes characteristics of the creative person and process, and summarizes tests of creativity.

Marilyn Franzen and Margaret Sherry, *Problem Solving Creatively*, 2279 Dahlk Circle, Verona, WI 53593, 1981. A handbook for teachers on teaching creativity and creative problem solving. Includes sample creativity exercises. 70 pp.

Resources:

Pamphlets

US Environmental Protection Agency, *Toxic Information Series—PCBs*, EPA Region 5 Office, 230 South Dearborn St. Room 1165, Chicago, IL 60604, 1980.(312) 353-2291. A four page pamphlet describing the dangers of PCBs and the government's response to the hazard.

Weimer, Linda, Warren Downs, Cathy Manson and PeytonSmith, *The ABC's of PCBs*, University of Wisconsin Sea Grant Program, Madison, WI 53706, 1978. A six page pamphlet in question and answer format. It provides a comprehensive yet easily understood overview of PCBs— their nature and uses, history, environmental effects, health impacts and persistence.

Films

"Can We Fish Again," 14 min., Color, RKO Radio Pictures,1977. Explores the effects of the toxic substances PCBs and PBBs on the quality of life. Examines the presence of PCBs in the Great Lakes and their effects on commercial and sport fishing. Appropriate for audiences from the junior high school level to adult.

"The Great Cleanup," 51 min., National Film Board of Canada, 1976. First half of film concentrates on the history, magnitude, offerings and problems of the Great Lakes; a fisherman, a steelworker, environmentalists and others appear to explain their positions. Second half looks at the progress being made to clean up the Great Lakes with explanations of the bi-national efforts, specific pollution problems and methods of fighting them.

The Problem At Manitou Harbor

Manitou Harbor is becoming shallower. Sand and soil (sediments) from the land along Spirit River have flowed downstream. They are filling in the bottom of Spirit River and the harbor.

Large lake freighters and barges use the harbor to bring oil, coal, salt and other bulk commodities to Port Manitou. It is also used by recreational boaters visiting the Yacht Club.

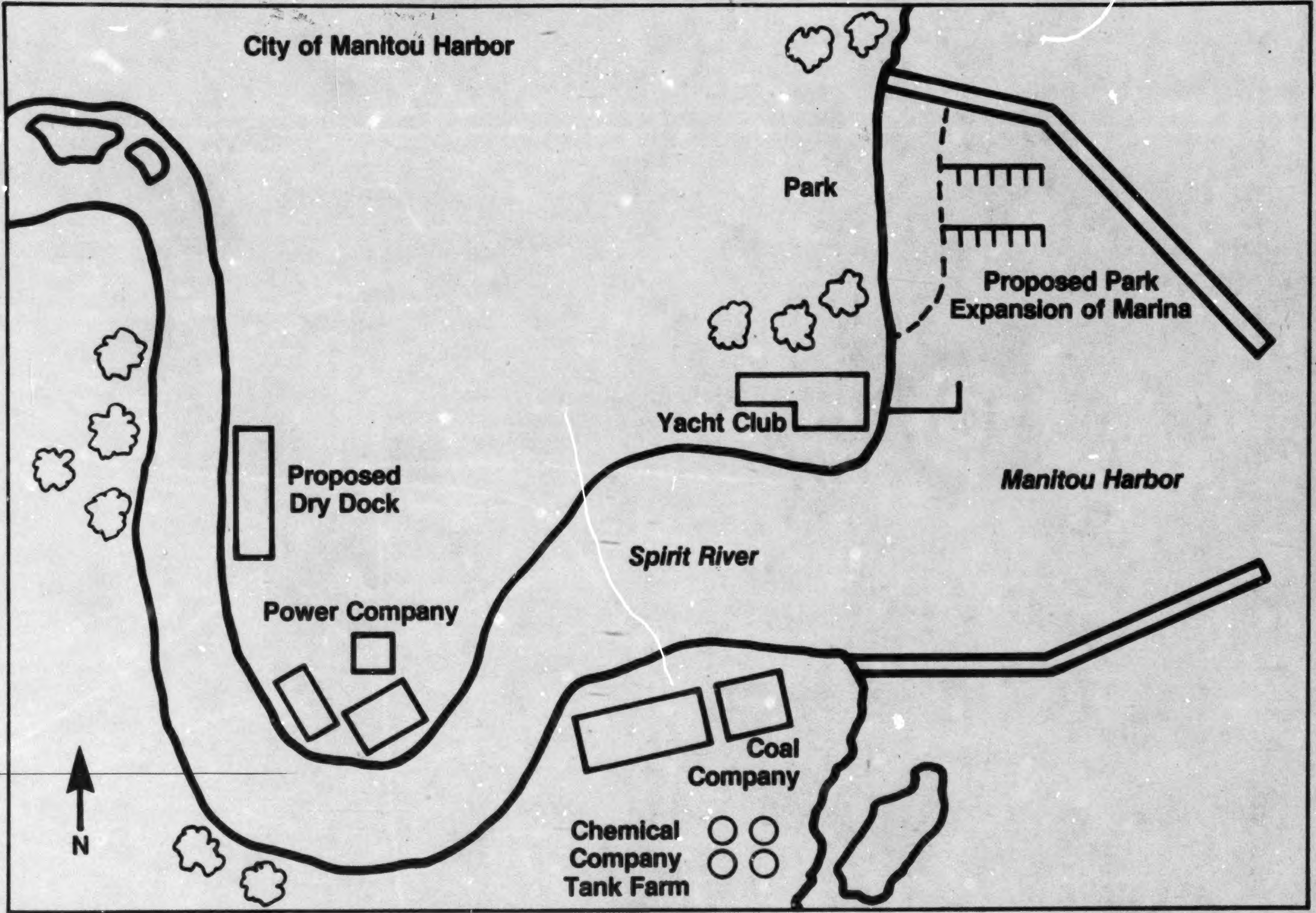
The U.S. Army Corps of Engineers has the job of keeping waterways navigable (deep enough and wide enough for ships to pass). The Corps is prepared to dredge Port Manitou Harbor to 20 feet (6 meters) deep. It is currently 17 feet (5 meters) deep. A standard lake channel is 28 feet (8.5 meters) deep.

The Mayor and Planning Commission of Manitou Harbor have planned to expand the city park and build a large recreational boat marina. They can do this with help of the Corps of Engineers by dumping sediments dredged from the harbor bottom inside a retaining wall in the harbor to create new shoreland. They hope the marina will bring new recreation business to the city and provide more jobs.

However, the State Environmental Protection Department has tested the harbor bottom sediments and found PCBs. PCBs are toxic chemicals (polychlorinated biphenols) no longer produced in this country. The chemical compound lasts for hundreds of years without breaking down. In high concentrations it has a harmful effect on fish, birds, and other wildlife. Even in very low concentrations [below 50 parts per million (ppm)] it is believed to cause health problems. Furthermore, it moves up the food chain as bigger organisms eat smaller ones. While very small organisms like one-celled plants and animals may have harmless levels of PCB's in their bodies, large fish like lake trout and salmon have collected large amounts of the chemical.

The State Environmental Protection Department warns humans not to eat the fish from Manitou Harbor more than once a week. The Department has also found that relatively clean sediment has buried more harmful sediment in the harbor bottom and that PCB levels in Manitou Harbor fish are lower than in past years. The Department has two concerns: 1) dredging will stir up PCBs from the bottom which will then enter fish in very high concentrations and 2) PCB contaminated sediment will be dumped into new areas where it may cause new contamination.

How can Manitou Harbor be dredged safely?


City of Manitou Harbor
Park
Proposed Park
Expansion of Marina
Yacht Club
Manitou Harbor
Proposed
Dry Dock
Spirit River
Power Company
Coal
Company
Chemical
Company
Tank Farm
N